

October 5, 2012

Volume 34 Number 20

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## High-Performance Computing Goes Green

Supermicro Works To Combine Capacity, Simplicity & Efficiency

AS A DATA CENTER MANAGER, you face many challenges. Perhaps one of the biggest is the need to accommodate your enterprise's growing resource and performance demands while being aware of space, power, and budget constraints. That's one of the drivers behind the Green IT movement and the need to find suppliers of high-performance, cost-effective, and energy-efficient products.

It comes down to the need to reduce skyrocketing data center operational costs (OPEX)—a large portion of which are energy-related. As energy costs continue to escalate, enterprises need to spend more to power and cool their server hardware than to purchase it.

Supermicro has been working to help enterprises meet those demands and was the first manufacturer to create an entire server product line, the PUE-Optimized SuperServer® solutions, which are purpose-built to optimize data center energy usage. Now the company is taking that one step further with the Supermicro FatTwin™.

### Expanded Compute & Storage Capacities

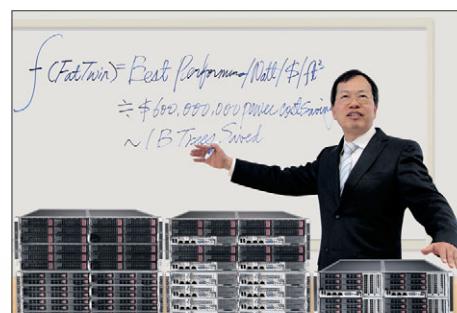
The FatTwin expands compute and storage capacities beyond Supermicro's existing 2U Twin<sup>2</sup> and 2U Twin SuperServer systems for increased performance with lower power consumption, according to Supermicro. Because of its shared components, the FatTwin improves cost-effectiveness and reliability, while its modular architecture makes it flexible to configure and easy to maintain.

"With support for dual 135W Intel Xeon E5-2600 CPUs per node, maximum storage capacity per U, and airflow-optimized designs supporting high ambient operating temperatures up to 47 degrees Celsius, FatTwin delivers on all fronts to save on infrastructure space and energy

costs while protecting our environment," says Charles Liang, Supermicro president and CEO. The FatTwin is part of Supermicro's Server Building Block Solutions, which provide the widest range of standard server rack computing platforms supporting the x86 architecture on the market today, he says.

The FatTwin is available in high-density 8/4/2 hot-plug system node configurations with a choice of memory capacities, hard disk drives, power supplies, front or rear I/O, PCI and networking options, and power supplies. Its shared cooling architecture uses smaller numbers of larger, more power-efficient fans to cool the system, saving as much as 10% in power usage. The FatTwin can be optimized for many different environments.

Charles Liang,  
Supermicro  
President  
and CEO



**FatTwin™** = Best Performance / Watt / \$ / ft<sup>2</sup>  
= \$600,000,000 Power Savings  
~ 1 B Trees Saved

Supermicro FatTwin™ power and cost savings per Node

The Supermicro FatTwin™ Front I/O configuration with a 1,280-watt power supply achieved a 210-watt and \$184 cost savings over a competitor's comparable H2312WPJR system at peak power.\*

the highest density computing solutions in standard rackmount chassis on the market," Liang says. The platforms accommodate up to 12 GPUs in 4U and provide advanced energy-saving technologies such as Platinum-Level power supplies and airflow-optimized designs.

They feature greater memory capacity up to 512GB, higher-performance I/O and connectivity with PCI-E 3.0, along with the latest processors.

### Focus On Energy

In the past, supercomputer manufacturers have focused on speed as the best measure of performance, which has led to the development of supercomputers that consume huge amounts of electricity and produce extreme amounts of heat. "In addition," Liang says, "the emphasis on speed has caused other considerations such as reliability, availability, and usability to be largely ignored."

Supermicro takes a different approach, focusing on speed with maximum power efficiency. "Over many years of experience,

Supermicro has become an industry leader in power-saving technology," Liang says.

Supermicro engineers continue to improve green technology as a primary product design objective. Some areas of focus at Supermicro include:

**Optimized system architecture.** Created to take advantage of Supermicro's power-saving technologies to produce optimal cooling at all application levels.

**Motherboards.** Supermicro works to develop designs with leading-edge technology and high-end components such as high-efficiency VRMs (voltage regulator modules) to reduce energy consumption.

**Power supplies.** High-efficiency Platinum-Level digital designs can run at significantly higher efficiencies of up to 95%, greatly reducing energy losses.

**Cooling subsystems.** Products such as advanced technology heat sinks, pulse-width modulated fan speed controls, structured chassis airflow designs, and intelligent temperature and power management, all architected for the most effective cooling of components.

"As a result of these efforts, the TCO of Supermicro's servers and computer systems has decreased significantly over time," Liang says. "Each of our 95% efficient systems, compared to others equipped with traditional 70 to 80% efficient power supplies, can save up to \$200 to \$500 per year depending on configuration and usage." And, in today's world of skyrocketing energy prices and environmental concerns, investing in products that combine efficiency, performance, and cost savings just makes sense. □

### Contact:

(408) 503-8000 | [www.supermicro.com](http://www.supermicro.com)

\*Results based on Supermicro internal testing.



In addition to the FatTwin, Supermicro offers the GPU SuperServer® and Super-Workstation, 8-Way/4-Way SuperServer® systems, and GPU SuperBlade® for high-performance computing environments.

Supermicro's 2U GPU SuperServer and highly flexible FatTwin architecture provide

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- \$25,000 to \$49,999
- \$50,000 to \$99,999
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"We recognized that there was a need for an IT and office products e-retailer

that sold specifically to this large market. NeweggBusiness offers its SMB customers a wide product selection, competitive prices, great customer service, and most importantly, it's conveniently available 24 hours a day, seven days a week," says Annie Yeh, vice president of NeweggBusiness.

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NeweggBusiness offers regular exclusive deals, partnering with manufacturers to offer discounts on select products. Plus, the NeweggBusiness E-Blast includes information on the best deals, exclusive promotions, sweepstakes, and advanced product previews.

The NeweggBusiness site also includes other valuable tools. Universal Power Supply, Ink & Toner, Memory, and Cable finder tools provide basic information, links, and graphics to pinpoint what you're looking for and ensure you get the right product the first time.

"NeweggBusiness has a number of resources available to SMBs, including a great product selection, how-to videos, and reliable reviews. We're committed to building out these resources in order to serve the SMB community and their growing professional needs. We want to be a one-stop shop for small and medium-sized businesses everywhere." □

## FEATURED PRODUCT

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**How much power** do your servers use? Are they using that power efficiently? How do you know? Those are the types of questions the Power Assure PAR<sup>4</sup> measurement service can help answer. And, when combined with Power Assure EM/4 data center infrastructure management software, you'll be able to quickly visualize, identify, and remedy inefficiencies in a comprehensive way.

### Better Efficiency

Energy efficiency isn't new to data centers, and they can become more efficient through two major areas, according to Clemens Pfeiffer, CTO and founder of Power Assure.

### POWER ASSURE EM/4 & PAR<sup>4</sup>

(888) 225-1575  
www.powerassure.com

By using both the EM/4 data center infrastructure management tool and PAR<sup>4</sup> measurement service, data centers can make the best use of their available space, power, and cooling.



The first area is in the energy consumed by IT resources, especially servers. Current server utilization rates hover about 10% for dedicated servers and 20 to 50% for virtualized servers, Pfeiffer says. "The only thing servers do when they are underutilized, which can be up to 80% of the time, is waste energy—and money," he says.

The second area where data centers can achieve greater efficiency is in the need to dissipate heat created by IT resources. In most data centers today, cooling consumes about as much energy as the IT equipment, Pfeiffer says. Adopting a hot aisle/cold aisle configuration and raising the cold aisle temperature to 80.6 degrees Fahrenheit are a start, but doing so can create the risk of hot spots forming without careful and continuous monitoring.

### Powerful Combination

The PAR<sup>4</sup> measurement service tells you exactly how much power a server uses at four power levels: powered off, idle, fully loaded, and at peak. "This is invaluable data—not estimates—collected using the Underwriters Laboratories (UL) tested PAR<sup>4</sup> methodology (UL2640 standard)," Pfeiffer says.

By making decisions based on these "true consumption numbers," Pfeiffer says, enterprises "can often double data center

compute capacity and eliminate the need for building costly new facilities."

At first glance, Power Assure EM/4 may look like any other DCIM system. It supports both the industry-standard and popular proprietary protocols used to measure power consumption, which means there are no special agents to install or extra wires to run to measure power at the building, circuit, and device level, Pfeiffer says. EM/4 also measures environmental conditions, such as temperature, humidity and airflow, throughout the data center.

But EM/4 sets itself apart through advanced capabilities such as auto-discovery, real-time monitoring, capacity planning analytics, BMS (building management system) integration, comprehensive reporting, and the ability to automate processes in cooperation with load-balancing or virtualization systems to continuously match server capacity with demand.

"The ability to match server capacity with actual demand in real-time is unique to EM/4," Pfeiffer says. Plus, he says, EM/4 accommodates the needs of both IT and facility managers as it's available with basic, advanced monitoring, and enhanced analytic modules targeted at the specific needs of either the IT manager or the facility manager.

"To prevent data centers from being outgrown by exhausting available space, cooling, or power (every data center manager's worst nightmare) it is necessary to both minimize and constantly manage the energy consumed," Pfeiffer says. "The combination of EM/4 and PAR<sup>4</sup> are unique in their ability to enable IT and facility managers to accomplish both tasks easily and effectively." □

### Faceplate



### PAR<sup>4</sup>



By using PAR<sup>4</sup>, this 10kW rack was able to go from having the power maxed out while only half full to being full and still having power left to spare.

## FEATURED PRODUCT

# Evaporative Cooling Small Enterprises Can Afford

Mestex Aztec Evaporative Cooling Systems Come Ready To Install & Control



**IF EVER THERE WERE** a cooling system suited for enterprises seeking energy-efficiency savings without sacrificing performance or scalability, it's the Aztec Evaporative Cooling System from Mestex, a Dallas-based marketing/manufacturing division of Mestek.

Traditionally, small to midsized enterprises have had the fewest options for reducing PUE, OPEX, and CAPEX costs, says Mike Kaler, Mestex president. This includes the evaporative cooling solutions now being commonly deployed as custom systems typically too pricey for smaller deployments.

The Aztec system provides self-contained, rooftop-installable, "bite-sized" units pre-engineered and preconfigured with digital control and monitoring software. Beyond deploying the Aztec on a need-only basis, companies can integrate an Aztec unit into an existing ventilation system (either as a standalone unit or into an air-handling unit). The Aztec works with and without underfloor constructions.

## Easy Does It

The Aztec can provide indirect evaporative, indirect/direct evaporative, or evaporative cooling with DX (direct expansion) or ChW

(chilled water) supplemental cooling. It delivers indirect evaporative cooling via a cooling tower and chilled water coil integrated in the unit, an approach that simplifies installation and data center infrastructure requirements. Integrating the cooling tower also enhances data center redundancy, Kaler says, as a cooling tower failure would impact only one Aztec air handler, not other data center units.

"Aztec systems are sometimes referred to as 'plug and play' because of their one-piece, pretested configuration, which only requires connection of water and power to become functional at the job site," Kaler says. "While startup commissioning is required for any HVAC system, the time required for this task is greatly reduced on the Aztec system because it was already set up and tested at the factory, only requiring adjustment in the field for local site conditions."

The Aztec is also the only evaporative cooling system that ships with a fully tested integrated digital control system, Kaler says. Manufacturing and testing the system in-house enables Mestex to deliver the Aztec ETL-approved and meeting normal local build codes.

Beyond managing the unit's temperature and pressure control via up to five cold-aisle temperature and one cold-aisle pressure sensors per unit, the digital control system monitors operation and provides service notices, temperature trend recording, and optional GUIs accessible onsite or via Internet access.

"The integral DDC controls can eliminate, or defer, the need for a third-party DCIM package, and the plug-and-play configuration reduces data center infrastructure costs and build-out time," Kaler says. "You could correctly think of the Aztec system as a containerized evaporative cooling system."

## Excellence In Energy

Companies can configure the Aztec to combine indirect evaporative cooling and "fresh air cooling," Kaler says, for "the most energy-efficient option available for data center designers who want to achieve a very low PUE."

One self-contained Aztec unit can support the environmental requirements of up to 18 42U racks operating at maximum levels. As server capacity increases, IT can

simply install additional Aztec units without needing to perform major renovations or component purchases.

"An Aztec system is actually ideal for the data center that isn't fully populated from the outset," Kaler says. Because each Aztec system is essentially a self-contained cooling module requiring only a water and power connection, IT can simply add additional Aztec units as the data center grows. □

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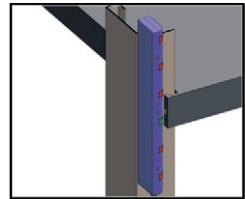
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RM417 / RM418



RM417 Rear view



RM418 Rear view

## Features: RM417

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## Features: RM418

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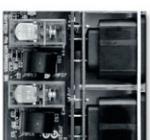
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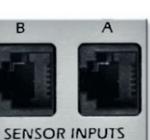
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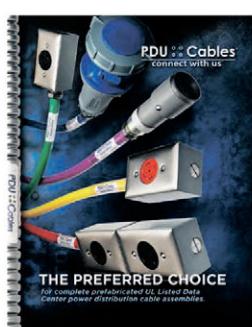
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## Cloud Hype Causes Common Misperceptions, Gartner Says

All the buzz and hype surrounding private cloud computing is resulting in confusion and misperceptions, Gartner says. "The growth of private cloud computing is being driven by the rapid penetration of virtualization and virtualization management, the growth of cloud computing offerings, and pressure to deliver IT faster and cheaper," says Tom Bittman, vice president and distinguished analyst at Gartner. But IT organizations need to be careful to avoid the hype and focus on private cloud computing efforts that make the most business sense. Bittman highlights five misconceptions about the private cloud:

### 1 Private cloud is not virtualization.

Although private cloud computing leverages some form of virtualization, virtualization can be enabled in many different ways.

### 2 Private cloud is not just about cost reduction.

In fact, private clouds require investment in automation software, and the savings alone might not justify the cost.

### 3 Private cloud is not necessarily on-premises.

The majority of private clouds are on-premises, but a growing percentage will be outsourced and/or off-premises.

### 4 Private cloud is not only infrastructure as a service.

The fastest growing segment of cloud computing is IaaS, but IaaS only provides the lowest-level data center resources in an easy-to-consume way.

### 5 Private cloud is not always going to be private.

Over time, some private clouds will be moved to the public cloud, but the majority of private cloud services will evolve to enable hybrid cloud computing.

## IT Hiring Showing More Positive Signs

About 9% of chief information officers plan to expand their IT departments during the fourth quarter of this year, more than 90% are at least somewhat optimistic about their companies' growth, and 44% are confident their firms will invest in IT projects. Those numbers are part of the latest "IT Hiring Index and Skills Report" issued by Robert Half Technology. About 6% of CIOs expect to cut back their IT staff during the fourth quarter and 83% plan no changes in IT staffing levels, according to the report. More than 50% of CIOs say it's difficult to find skilled professionals, with network administration, database management, and technical support professionals in greatest demand.

## Two Studies Shed Light On Cloud Computing Boom

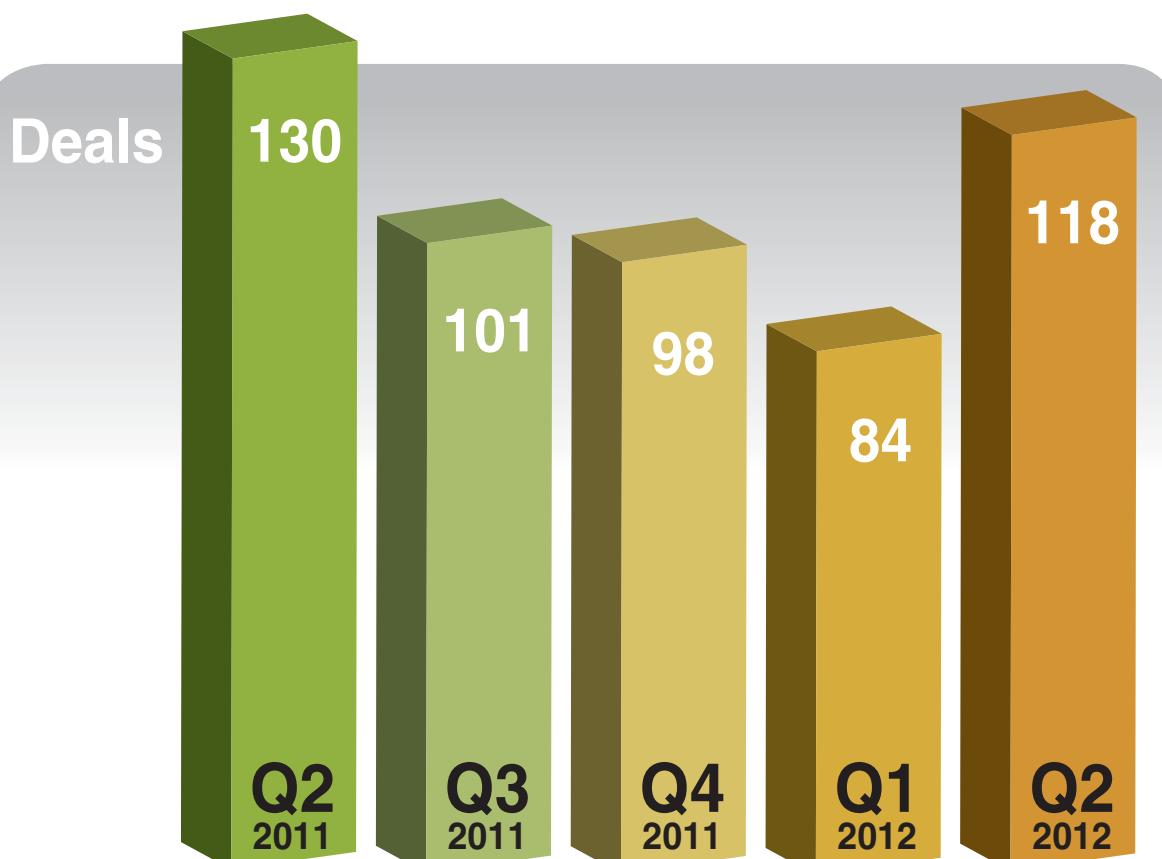
The cloud is big, and a new Gartner report attempts to give us a picture of its expected growth. This year, according to Gartner, the public cloud services market will grow about 19.6% to total \$109 billion worldwide. Business process services will be the largest segment, accounting for about 77% of the total market and \$84.2 billion in revenue. Software as a service is the second-largest segment, accounting for about \$14.4 billion in revenue, followed by infrastructure as a service with \$6.2 billion in revenue. By 2016, Gartner predicts, the public cloud services market will grow to \$206.6 billion.



According to new figures from research company IDC, global spending on IT cloud services will pass the \$40 billion mark this year and swell to nearly \$100 billion in 2016, exhibiting a growth rate IDC indicates as "five times that of the IT industry overall." IDC's message to vendors is to get on board with public IT cloud services, as the research company expects the category will amount to 16% of IT revenues combined in five areas: applications, PaaS (platform as a service), servers, storage, and system infrastructure software. "Quite simply," said Frank Gens, senior VP and chief analyst for IDC, in a press release, "vendor failure in cloud services will mean stagnation."

## Year Over Year, The Fall & Rise Of Venture Capital Investments

The average deal size of CVC (corporate venture capital) investments has outstripped that of overall VC investments in every quarter since Q2 2011, according to newly published data from CB Insights. The average VC deal was \$9.9 million in Q1 2011 and \$10 million in Q1 2012, and the average CVC deal was \$13.9 million and \$17.8 million over the same period. As the chart below shows, the number of CVC deals rose in Q2 2012 after declining since Q2 2011. CVC investment totals reached \$2.1 billion in Q2 2012 after a similar decline and rise over the past year.



## Enterprises Make Network Investments In The Second Quarter

Despite continued economic uncertainty, enterprises invested in network upgrades during the second quarter, according to Infonetics Research. Revenue in the Ethernet switch market was more than \$5 billion during the quarter, up 9% from the first quarter of this year and up 13% compared to a year ago. Gigabit Ethernet continues to be the largest market segment, with revenue posting year-over-year gains, according to Infonetics. That being said, demand for 10Gb switches nearly doubled from a year ago and sales of 40Gb devices grew more than 50% for the second straight quarter.

## DRAM Market Shift Signals Change In PC Market

PCs now account for less than half of the overall market for DRAM, signifying the start of the post-PC era, according to IHS iSuppli. The PC share of the DRAM market hasn't been below 50% since 1980 and accounted for the overwhelming portion of DRAM sales for decades. "The arrival of the post-PC era doesn't mean that people will stop using personal computers, or even necessarily that the PC market will stop expanding," says Clifford Leimbach, memory analyst at IHS. Rather, it represents the arrival of a new era in technology. By the end of 2013, PCs will account for about 42.8% of the DRAM market, according to IHS. During that same timeframe, the tablet share of the DRAM market will increase to 6.9% and the cellphone share will jump to 19.8%.

## Smartphone Study Sheds Light On Usage, Satisfaction

Apple ranks No. 1 among smartphone manufacturers when it comes to customer satisfaction, according to the latest study by J.D. Power and Associates. This is the eighth time in a row that Apple has ranked at the top. HTC came in at No. 2. Recent research by J.D. Power and Associates also found that the cost of a traditional wireless mobile phone was \$56, down from the average price of \$66 a year ago. Most of the cost reduction can be attributed to discounts provided by handset providers and service carriers, according to the study. Less than 20% of smartphone customers chose their smartphone based on price. About 20% of smartphone owners have experienced a software or device malfunction, with those issues having a significant impact on overall satisfaction with the device.



## BYOD Gaining Traction In Large Enterprises

About 45% of IT directors say that the personal hardware and software they use are more useful to them than the tools and applications provided by their companies. That's among the findings of the fourth annual CIO Barometer conducted by CSC. BYOD, or Bring Your Own Device, and the related consumerization of IT are having a positive impact on employee morale, according to the survey, with 88% of respondents saying the use of personal devices at work increases job satisfaction. But all this good news doesn't come without concern, as 72% of IT directors surveyed are worried about increased security incidents from the use of mobile devices.

## Businesses Struggle With Disposing Of Old IT Hardware & Electronics

Businesses in the United States aren't sure what to do with their used equipment, according to a study by research group IDC, and more than a third of companies don't use proper disposition methods. Practices such as storing assets or using municipal waste services are still common, IDC reports, leaving companies at legal risk and unable to take advantage of cost containment opportunities available through equipment resale and other options. IDC research director David Daoud says there's actually less focus on environmental issues now than in the past. "The environment was one of the top two concerns from 2003 to 2008 driven by the Green IT debate, but then the 2008 financial crisis forced a change in mindset," he says.

## Mobile Messaging Not Static, Set To Double In Five Years

Juniper Research has released a new report about mobile messaging that includes a forecast that mobile messaging traffic will almost double from 14.7 trillion messages this year to 28.2 trillion messages by 2017. Juniper included the common SMS (Short Message Service, or text) and MMS (Multimedia Messaging Service) types as well as IM (instant messaging), social media messaging, and the newer RCS (Rich Communications Suite) and RCS-e (RCS-enhanced). "SMS traffic will remain the largest type of messaging traffic as mobile subscribers continue to embrace its ubiquity, reach, and reliability," Juniper reports, and social media will also play a prominent role in messaging growth.

## Green Data Centers On The Rise

With data centers always looking to improve energy efficiency and be more environmentally friendly in general, it makes sense that Pike Research foresees the green data center market growing to \$45.4 billion by 2016, which is over two and a half times more than the current total of \$17.1 billion. Pike Research says that data centers are investing in newer, more energy-efficient equipment, which is helping drive the market. But virtualization and cloud technology are also gaining more ground in companies, which can lower the overall footprint of a data center, introduce even higher operating efficiency, and make the facility greener.



## Study Finds Causes Of Potential Wireless Data Overcharges

New findings from a UCLA study indicate that mobile subscribers generally pay for what they request, but sometimes pay for more than they actually receive. The researchers examined two unnamed U.S. carriers accounting for more than half of U.S. mobile subscribers and found that the carriers generally recorded data usage accurately. When devices attempted to access wireless data in areas where coverage was weak, however, especially if the data involved streaming audio or video, opportunities for overcharging were possible. According to the researchers, this happens when a request is successfully received by the provider and data is sent to the device, but the device doesn't actually receive all of the data. In these cases, users may be overcharged up to 7% or more.

## Free Apps Account For Most Downloads

Most people are looking for apps that are free, according to research firm Gartner, which expects that free apps will account for 89% of all downloads this year. Rather than charging for apps up-front, Gartner reports, an in-app purchase business model is a more effective way of converting free app users into paying customers and then retaining them with a good user experience and continued product updates. In-app purchasing also works to build a recurring revenue stream, Gartner reports. By 2016, in-app purchases will account for 41% of store revenue, with the number of available apps following the in-app purchasing model accounting for 30% of total downloads.

## SIX QUICK TIPS

# Cut Down On Data Center Noise

Look At Servers, Fans & Other Culprits

**DATA CENTERS ARE FULL** of equipment that often requires large amounts of power and has many moving parts. Because of that, there can be a variety of sounds mixing together to create ambient noise in the data center as well as in surrounding office spaces.

It's important to limit data center noise as much as possible because it not only affects the people working in the room and employees right next door, but also customers and visitors touring your facilities or trying to hear each other talk. There are many ways to cut down on data center noise, but to get started, you need to find the source and correctly solve the problem.

## ✓ Get A Data Center Environment Assessment

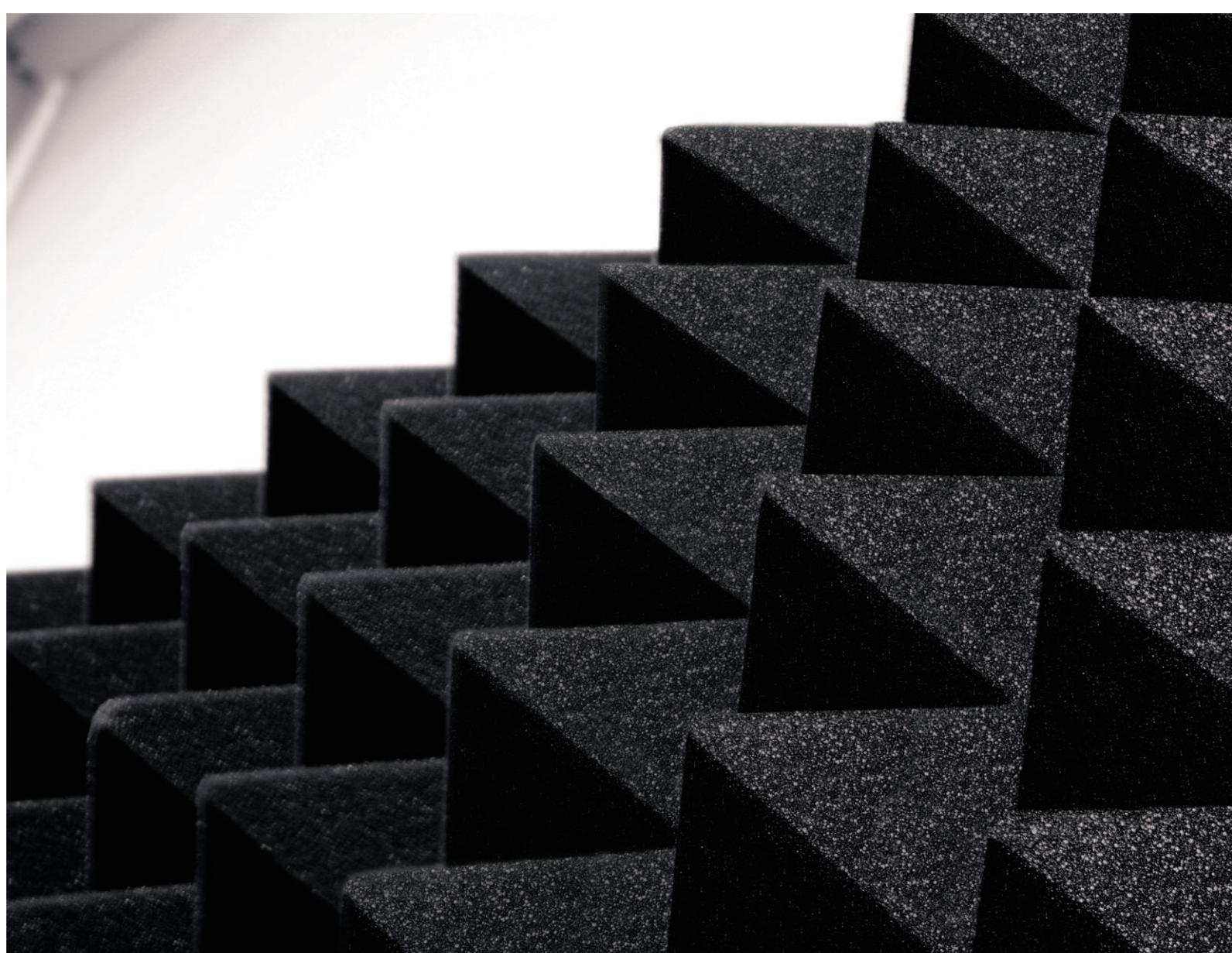
If you're certain your data center is emitting too much noise, then a great way to pinpoint the problem is to invest in a data center environment assessment. These assessments "are designed to optimize the utilization of power and cooling infrastructure by identifying hot spots and other risks to the data center, including noise," says Nicholas Cua, managing director at Mainline Computer Products (800/686-5312; [www.mainlinecomputer.com](http://www.mainlinecomputer.com)). If you do opt for an environment assessment, make sure you emphasize the need for noise-related solutions so

the third-party team will know what to look out for. The team can even use a sound meter to measure the decibel level in the room.

Cua also recommends scheduling the "routine cleaning of your data center by technically trained specialists who will uncover problems in your data center infrastructure contributing to noise." There are a lot of factors that can contribute to elevated data center noise. It could be air having trouble making it through a clogged air filter or equipment being affected by dust and debris. Regularly cleaning your equipment and data center is a great way to prevent buildup and the noise it can cause.

## ✓ Perform A Walkthrough & Research Solutions

A data center environment assessment team will point the most likely issues related to excessive noise, but there are other ways to hone in on the biggest offenders. "Investigate where the noise comes from, other than the obvious servers," says Deborah Petty, president of Rackmount Solutions (866/207-6631; [www.rackmountsolutions.net](http://www.rackmountsolutions.net)). "Walk around with several people, holding a normal conversation, and see where they begin to not hear you or have difficulty understanding clearly." After the walkthrough, you can make a list of the most troublesome areas that need to be addressed.



But before you come up with your own solutions to the noise issues or invest in a sound-dampening solution that may not be necessary, Petty recommends contacting the equipment dealer or manufacturer to see if it has any suggestions or quick fixes. "Call your dealer first and ask if the manufacturer of the equipment has something to address the noise," Petty says. "If you don't get fast data back, call the manufacturer yourself. They may have an obscure part or product that will make a big difference. Plus, when manufacturers hear directly from the end user, they pay closer attention to problems or can get creative to help fix something that may be reasonably unique to your setup."

**✓ Install Sound-Dampening Cabinets**

More often than not, you'll find that the noise issues in your data center are being caused by servers and other components housed inside racks and cabinets. After all, these pieces of equipment are the work-horses of the enterprise and have the most moving parts that could be causing noise. One option is to put that equipment in a new enclosure that will help cut down on noise and provide other benefits.

"Sound-dampening cabinets do a terrific job of bringing the decibel level down, and several models also provide up to 7kW of heat dissipation, which is outstanding,"

Petty says. "The sound attenuation can be truly remarkable with very satisfactory results, and housing loud equipment is easy in a rack dedicated to reducing sound."

**✓ Is Cooling Is The Culprit?**

Cooling systems are another large contributor to data center noise. They are critical to ensure your equipment operates at the optimal temperature and, depending on how many fans you have in your racks, they could be humming loud enough to annoy nearby employees. Petty recommends replacing your existing fans with quiet fans, which are designed cool efficiently with little aural interference. Cua would go one step further and change the fans in your air-conditioning units to variable-speed fans, which he says are "regulated by temperature."

In some situations, switching out fans isn't going to be enough to lower the noise levels of your cooling systems. Cua says that some cooling solutions use "up-flow designed air conditioning without ducting," but that by adding ducts, you can mitigate a certain level of noise. He also adds that you can implement aisle containment solutions, "which are now very popular to reduce noise considerably." Plus, he says, aisle containment solutions provide greater efficiency in power and cooling. By using solutions that reduce noise levels and improve the overall performance and efficiency of your data center, you can ease employee headaches and save money in the process. ■

**✓ Noise Can Be A Warning**

Keep in mind that sometimes the noise coming from your data center equipment isn't always normal. "Noise emitting from a CRAC or CRAH can indicate fan motors or fan belts are going out," says Nicholas Cua, managing director at Mainline Computer Products (800/686-5312; [www.mainlinecomputer.com](http://www.mainlinecomputer.com)). If the noise is the result of multiple pieces of equipment humming at the same time, then that could be a relatively minor issue. But if you are hearing intense rattling sounds coming from cooling systems, servers, or storage solutions, it could be a loud warning that a mission-critical component might be ready to fail.

**✓ Listen To Your Employees**

The easiest way to figure out whether the noise in your data center is a problem is to speak with your workforce. It would take uncharacteristically loud equipment to cause issues related to reverberation, but it doesn't take much more than a persistent buzz or beep to throw an employee off his game. "It's only a problem if it's a problem for your staff or customers," says Deborah Petty, president of Rackmount Solutions (866/207-6631; [www.rackmoundsolutions.net](http://www.rackmoundsolutions.net)). "If you're getting comments or complaints, you have a problem. Excessive noise can break concentration, prevent employees from communicating easily, and cause some staff members to develop low-level headaches."

**BONUS TIPS:**

**✓ Watch For Quiet-Running Equipment**

Deborah Petty, president of Rackmount Solutions (866/207-6631; [www.rackmoundsolutions.net](http://www.rackmoundsolutions.net)), says that although she hasn't necessarily heard that equipment is getting quieter by design, she believes it might be on its way soon as manufacturers fine-tune their products. "Anyone who can tout 'reduces noise substantially' has a real selling point over a competitor, assuming functionality is similar," she says.

**✓ Consider Sound-Proofing**

If you've done everything you can but there are still noise issues, consider sound-proofing your data center. Usually walls and insulation are enough to block out noise from the room, but if you want a library-quiet office space, sound-proofing is another option to consider.

## HOW TO

# Work The Cloud Into Your Backup Plan

Redundancy, Reduced IT Workloads Are Primary Benefits

**THERE'S A LOT TO GAIN** from backing data up to the cloud, including benefits tied to redundancy and reducing IT workloads. There are also numerous considerations to weigh, including cost. "Cloud backup is not free," says Jason Buffington, Enterprise Strategy Group data protection analyst. "A lot of SMBs, when they see the cost of cloud-based backup, get sticker shock." Enterprises should remember, however, they're not just gaining storage but management of that storage, he says. "You need to think of value and not price," he says.

## State Of Providers

Cloud storage has come a long way in recent years, says Megan Wohlford, Rackspace product manager ([www.rackspace.com](http://www.rackspace.com)), with successful providers now offering "solid SLAs, some going all the way up to 11 nines." Providers are also investing in security, she says, uploading data over SSL and providing authentication tokens that reset as frequently as hourly. In addition, some providers are even encrypting data at rest. "Big players are enjoying economies of scale and driving their costs down. Due to the competitive nature of the market, these cost savings are almost instantly passed on to the customer," she says.

Support, however, can still be an issue. Some early providers that designed their models for developers who essentially only required documentation and forums for support are only now adding live support, she says. Enterprises that need assistance

with cloud storage, she says, should look at "companies with long reputations of supporting customers."

Buffington says better cloud providers offer the same quality of training and support as on-premises backup providers. Thus, enterprises should have high expectations where experience of deployment, skills, and knowledge building are concerned.

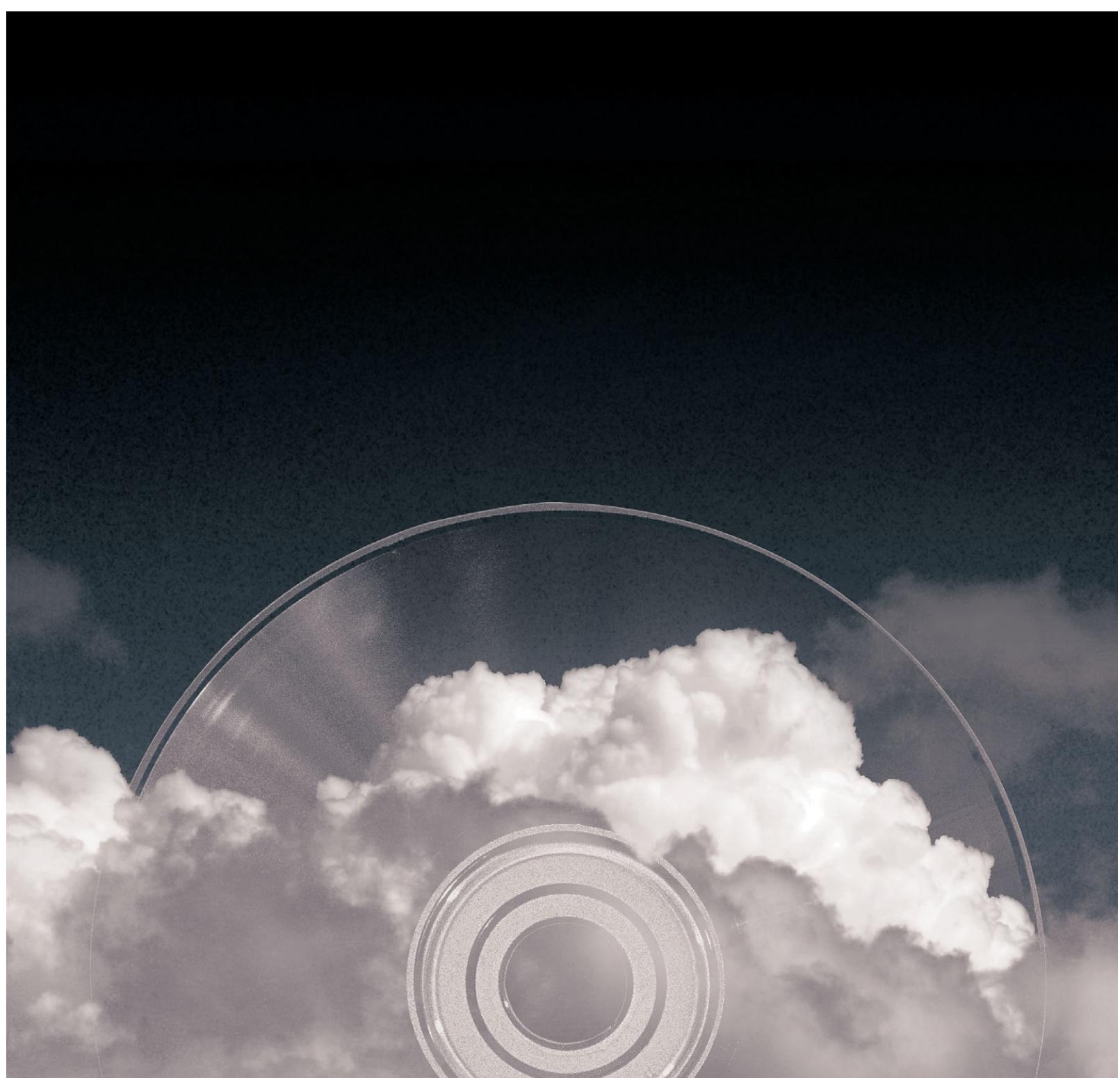
Victor Dermott, Logicalis solutions architect, cloud computing ([www.us.logicalis.com](http://www.us.logicalis.com)), says many providers have "become experienced, sophisticated solution providers." Some have integrated their services with the backup/archival software providers' products, he says, so "you can have a fully automated backup and archival process integrated with your current software."

## Key Points

- Cloud-based providers are now providing solid SLAs, better security, and competitive pricing.
- Moving data to the cloud can reduce IT data-management responsibilities.
- Enterprises should address potential bandwidth and network issues before committing to cloud backup.

## Who Can Benefit?

While backup is good business practice for everyone, Wohlford says, cloud backup is well-suited for businesses with



such large data amounts that “they’re being forced to manage an infrastructure to manage that load.” The cloud offers a means to offset raw storage resources and staff required to maintain that storage, she says. The cloud is also well-suited for businesses with varied data. Though organizations may deem some data too sensitive for cloud storage, it probably has double the amount that isn’t sensitive, she says. Here, a provider that allows enterprises to segment data for onsite and cloud storage could be a good option. “The key is that businesses can customize their cloud backup solution; it doesn’t need to be all or nothing,” she says.

Small to midsized enterprises in general are good cloud-backup candidates,

Dermott says, because they can acquire/consume storage with terms and at costs previously only available to larger organizations and now deliver a level of functionality, security, and availability not previously possible, he says. For example, Dermott says, “I can keep two copies of critical data in the cloud, it can be available (securely) to my manufacturing organization in the Far East, and they can update a copy for me without any intervention by my staff.”

#### Data Types To Move

Data that is well-suited for tape backup is often well-suited for cloud backup. “The cloud offers a similar cost-savings opportunity without the administrative and physical shortcomings of tape,” Dermott

says. Wohlford adds the cloud is perfect for data that companies won’t touch much. Companies with a seven-year retention policy, for example, won’t likely need to access data two or more years old. “Storing data that isn’t accessed much offsite is smart because it allows you to keep a lean infrastructure onsite and store older data inexpensively,” she says. Some providers, she says, will allow setting policies that help automate how long data is kept onsite vs. when it is pushed to the cloud.

Overall, backing data up to the cloud is easy, says Buffington, “it’s the restore that you need to pay attention to.” The trick is determining “how quickly can I get it all back?,” he says. Restoring a few files is simple, he says, but if you lose a server, “that’s a whole bunch of data to

pull back across the wire; it doesn’t matter how fast your wire is, that’s going to take you some time.”

Buffington says one ideal backup/recovery model is having a local IT integrator that doubles as offsite backup provider. “When you lose a server, the first person you’ll call is the guy who is going to bring you that new hardware. Wouldn’t it be great if they already have an offsite copy of your data, so they could just bring that with them when they’re bringing that new gear out?,” he says. Currently, he says, there are backup providers that “only sell their backup service through the channel through service providers, and in many cases those service providers are also a local integrator.” □

## Top Tips

- ✓ **Better manage your assets.** Victor Dermott, Logicalis solutions architect, cloud computing ([www.us.logicalis.com](http://www.us.logicalis.com)), says that after a cloud-data move, enterprises have an opportunity to change how they manage those assets. “Storage usage should become more policy-based and less of a concern about budget cycles,” he says. “Storage can be a monthly operating cost, not a capital expense. Policies can be driven by legal requirements and/or business requirements.”
- ✓ **Account for bandwidth.** Bandwidth is something all companies should consider before committing to cloud backup. For example, says Enterprise Strategy Group’s Jason Buffington, “if your WAN connection was already relatively busy, adding backup as a service will break it. You’re going to start pushing a whole lot more data across your wire than you used to.” Some cloud providers, he says, provide options tied to telcos so it’s all part of one bill.
- ✓ **Room to grow.** Megan Wohlford, Rackspace product manager ([www.rackspace.com](http://www.rackspace.com)), cautions that small to midsized enterprises that plan to eventually move a lot of data to the cloud should eye providers that can grow with them. Ask if the provider limits how much data you can store and the requests you make at a time. Providers may not share the exact space their data centers have, she says, but be open about your growth needs. “The last thing you want is to have 100TB with a provider and then have to figure out how to migrate that data elsewhere,” she says.

## Action Plan

- Assess your current data and backup situations
- Determine which data you can move to the cloud
- Determine access and permission levels required
- Decide if network and bandwidth upgrades are required
- Research possible providers
- Detail exact requirements to each candidate
- Note any regulations you must adhere to
- Review providers’ suggestions for solutions
- Estimate total costs and growth
- Pitch a solution and costs to management
- Consider a proof of concept or trial implementation
- Create a back-out strategy if the provider doesn’t work out

## Get Started

To initiate a cloud-based backup move, Megan Wohlford, Rackspace product manager ([www.rackspace.com](http://www.rackspace.com)), advises creating a migration plan. Actual migration, she says, “will require a full-time staff member to oversee and organize.” Victor Dermott, Logicalis solutions architect, cloud computing ([www.logicalis.com](http://www.logicalis.com)), says companies need someone who’s responsible for cloud storage administration, understands the organization’s data requirements and usage, and can develop and communicate plans for meeting requirements.

## HOW TO

# Add New Space As Needed

## The Modular Approach To Building A Data Center

**FOR SOME ENTERPRISES,** the question isn't one of needing more data center space; it's a question of how to add that space efficiently and affordably. For an increasing number of companies, the answer is using a modular data center solution, something that enables you to quickly obtain space and has the ability to expand as future needs dictate. Compared to building a new data center or retrofitting existing space, a modular solution can provide numerous benefits related to costs, speed, efficiency, and more.

### The Benefits

Modular data centers are available in various solutions, including preconfigured

shipping containers that the vendor may completely or partially build at its facility. Typically, these prefabricated structures are outfitted to meet IT-intensive needs, including those related to connectivity, power, and cooling.

Steve Borley, vice president of sales and marketing at Data Specialties Inc. (800/454-5164; [www.WeBuildDataCenters.com](http://www.WeBuildDataCenters.com)), says current offerings are energy-efficient infrastructure solutions that are easily and quickly deployable and can save enterprises hard and soft costs over time while still providing the redundancy and reliability of traditional data centers. "Most units range in sizes equivalent to shipping containers and therefore can be easily

placed and scaled to accommodate space and load demands," he says.

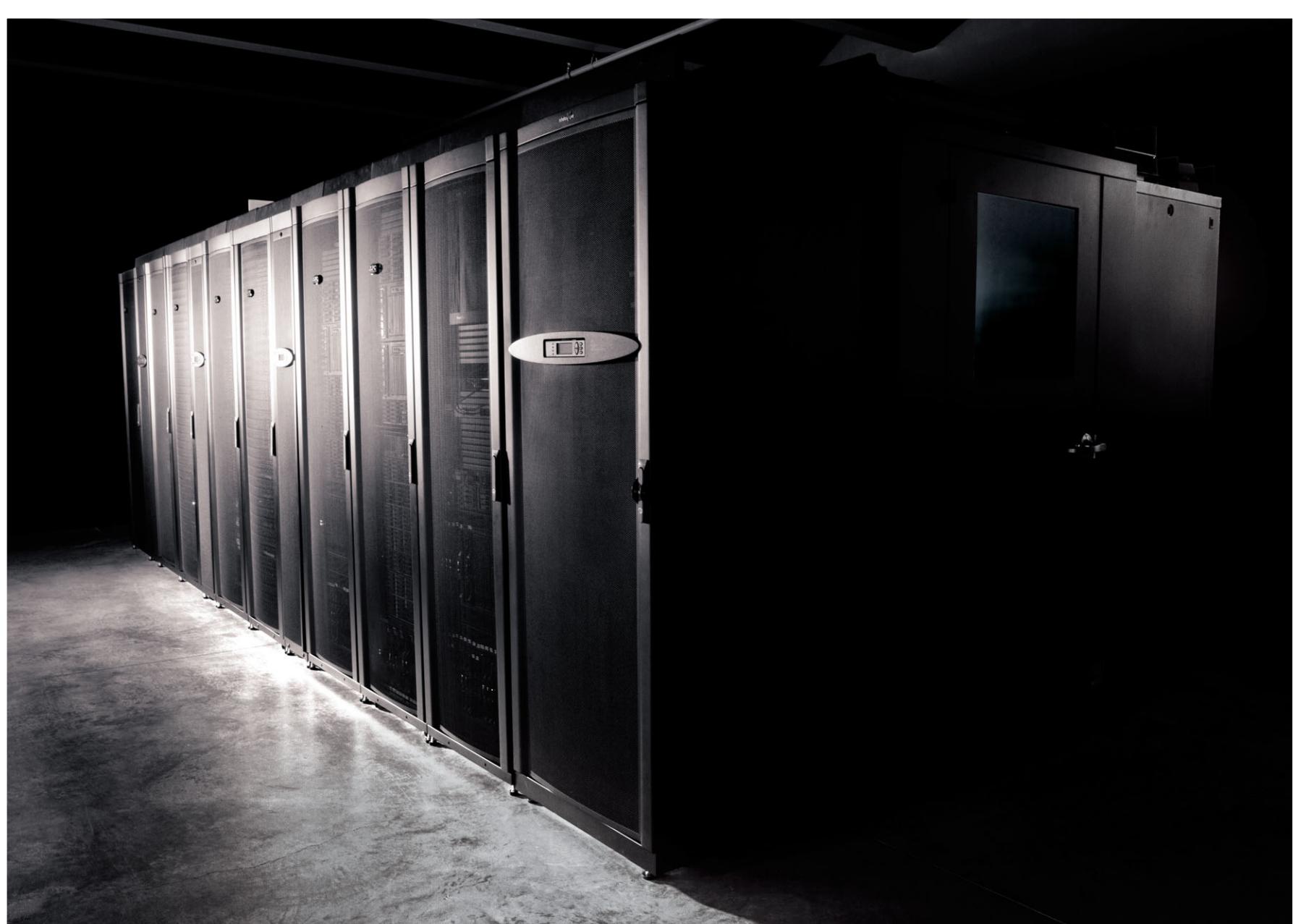
Loyd Guillot, director of the modular data centers business at TAS Energy ([www.tas.com](http://www.tas.com)), says modular data centers help companies to expand as their demand grows, thus freeing up long-term capital. Further, the approach provides companies with the ability to change their growth direction.

Chris Crosby, CEO of Compass Datacenters ([www.compassdatacenters.com](http://www.compassdatacenters.com)), says allowing businesses to add capacity as they grow, rather than all at once, is the one element various modular data center solutions share. "For example, a customer that expects to grow to 3mW [megawatts]

### Key Points

- Modular data centers are available in various types, including preconfigured shipping containers outfitted to meet IT requirements.
- Typically, modular data center operating costs are similar to traditional data centers but can save companies on capital expenditures.
- Modular data center solutions enable companies to expand data center space as requirements necessitate.

of capacity but only needs 1mW immediately can obtain the initial space required



now and the additional 2mW at a future time," Crosby says.

### The Disadvantages

Guillot says that, because the modular data center is a relatively new concept, the industry hasn't yet widely accepted it. "Instead of the traditional field-constructed approach, the modular data center solution requires change to internal practices that can be a challenge to implement," he says. Crosby says the most common consideration for enterprises eyeing modular solutions is they're typically located within a single facility shared with other customers. "Although the customer has its own

dedicated, four-walled 'suite,' they share all common areas—the loading dock, for example—with the other tenants of the facility," he says. "This can lead to scheduling and security issues."

Another factor companies must consider is the finite space within the building itself. "In some instances, customers must pre-lease the space they will need for expansion to ensure that it's available when it is needed. This means the customer is paying for capacity that they aren't using," he says. "Phased approaches" are dangerous if some components are shared. In these instances, future phases cannot be commissioned and tested due to 'live' data centers in place from earlier phases.

This lack of testability is like flying in an untested airplane."

### Good Candidates

Cost-wise, both Guillot and Crosby say operating a modular data center is on par with more traditional solutions. "It is the option value that creates the cost savings," Crosby says. Until recently, he says, options for adding data center space included colocation, building a data center, or using a data center provider's build-to-suit facility. "Colocation facilities offer very limited control, and building your own data center or having a provider build one for you is extremely costly from a time, manpower, and

dollars perspective," Crosby says. "Modular solutions are the cost-effective alternative from these options."

To determine if a modular data center makes sense, companies can evaluate past growth patterns and the expected future growth pattern to determine if building in multiple, manageable phases makes short- and long-term economic sense, Guillot says. Overall, Borley says modular data centers are a good fit for companies with critical timing needs, limited space, and/or those needing their data center in a remote location. "A modular data center solution also works well for military, government, oil rig, university, or medical facility clients," he says. □

## Action Plan

- Identify internal customer requirements and specifications and outline immediate and long-term goals and requirements. Then use these as a template to evaluate providers.
- Obtain all hard and soft costs.
- Conduct research into providers.
- Communicate your requirements and needs to providers.
- Visit existing sites that will mirror your own and ask questions of the end user.
- Check provider references.
- Pinpoint vendors that can meet your cost target.

## Top Tips

- ✓ **Evaluate vendor options.** Loyd Guillot, director of the modular data centers business at TAS Energy ([www.tas.com](http://www.tas.com)), says companies interested in acquiring a modular data center should begin by evaluating vendor options that fit the company's internal customer needs. "Subsequent steps could entail developing plans to match sales growth and specific evaluations around price, performance, and quality," he says.
- ✓ **Avoid obstacles.** Chris Crosby, CEO of Compass Datacenters ([www.compassdatacenters.com](http://www.compassdatacenters.com)), says while it's difficult to predict obstacles companies could encounter, issues commonly arise around a site's power and physical capacity as related to the business' ability to grow its data center operations over time. Another common occurrence with container-based installations involves the cost of the initial building required to house container units. "This requirement is very often overlooked and adds substantially to the cost of the overall project," he says.
- ✓ **Plan for extras.** Steve Borley, vice president of sales and marketing at Data Specialties Inc. (800/454-5164; [www.WeBuildDataCenters.com](http://www.WeBuildDataCenters.com)), says some modular units can require additional utility power, backup generation, and cooling system support infrastructure if the units aren't self-sufficient. Additionally, certain units can only be placed outside of building structures or in structures suitably ducted to provide ambient air supply and exhaust. Site preparations and communication fiber requirements are other possible considerations.
- ✓ **Environmental considerations.** Borley says the environmental impact of modular data centers are mostly similar to traditional data center, though certain manufacturers "offer infrastructure that can save as much as 40% in required cooling conditions, saving on not only costs but natural resources and energy, as well."



## Get Started

The most important step for any company contemplating obtaining its own data center is establishing goals that it wants the data center to address immediately and over an agreed upon timeframe, says Chris Crosby, CEO of Compass Datacenters ([www.compassdatacenters.com](http://www.compassdatacenters.com)). These goals must include such considerations as the degree of risk the organization is willing to carry and the monetary parameters it is willing to assume to mitigate this risk.

"All this information must be translated into size requirements expressed as kW of IT load," he says. "All these things should be clearly understood and agreed upon before any overtures are made to potential providers." Once all requirements are clearly established, they'll serve as a template for evaluating potential providers, he says. From there, focus on how well each provider can address your needs, check their references, and determine which ones can meet your cost target.

## SIX QUICK TIPS

# Minimize & Prepare For Data Recovery Failures

Plan Well To Protect Your Company From Data Loss & Downtime

**FOR A DATA CENTER**, data loss can either be a minor inconvenience or a large-scale catastrophe. That's why it's important to have backup solutions and a data recovery system in place. You may think you're fully protected by simply having these solutions in your data center, but what if one or more of them were to fail? In order to avoid a worst-case scenario, you need to have a plan ready to go, monitor your recovery solutions at all times, and know what you'll do if you need someone to manually recover your data.

## ✓ Develop A Rock-Solid Data Recovery Plan

When it comes to data recovery, your chances of success or failure begin and

end with the plan you put in place. You have to come to terms with the fact that a server may go offline, a power surge may put your facility in a standstill, or someone might wipe a hard drive by accident. You need to know how your systems are being backed up, how to access your backed-up data when you need it, and how to avoid downtime through preparation. But in addition to having a data recovery plan, you should also make sure you know how your IT employees will respond to and rectify a data loss event.

"The first critical step is to build the right disaster recovery team," says Victoria Moore, research analyst at

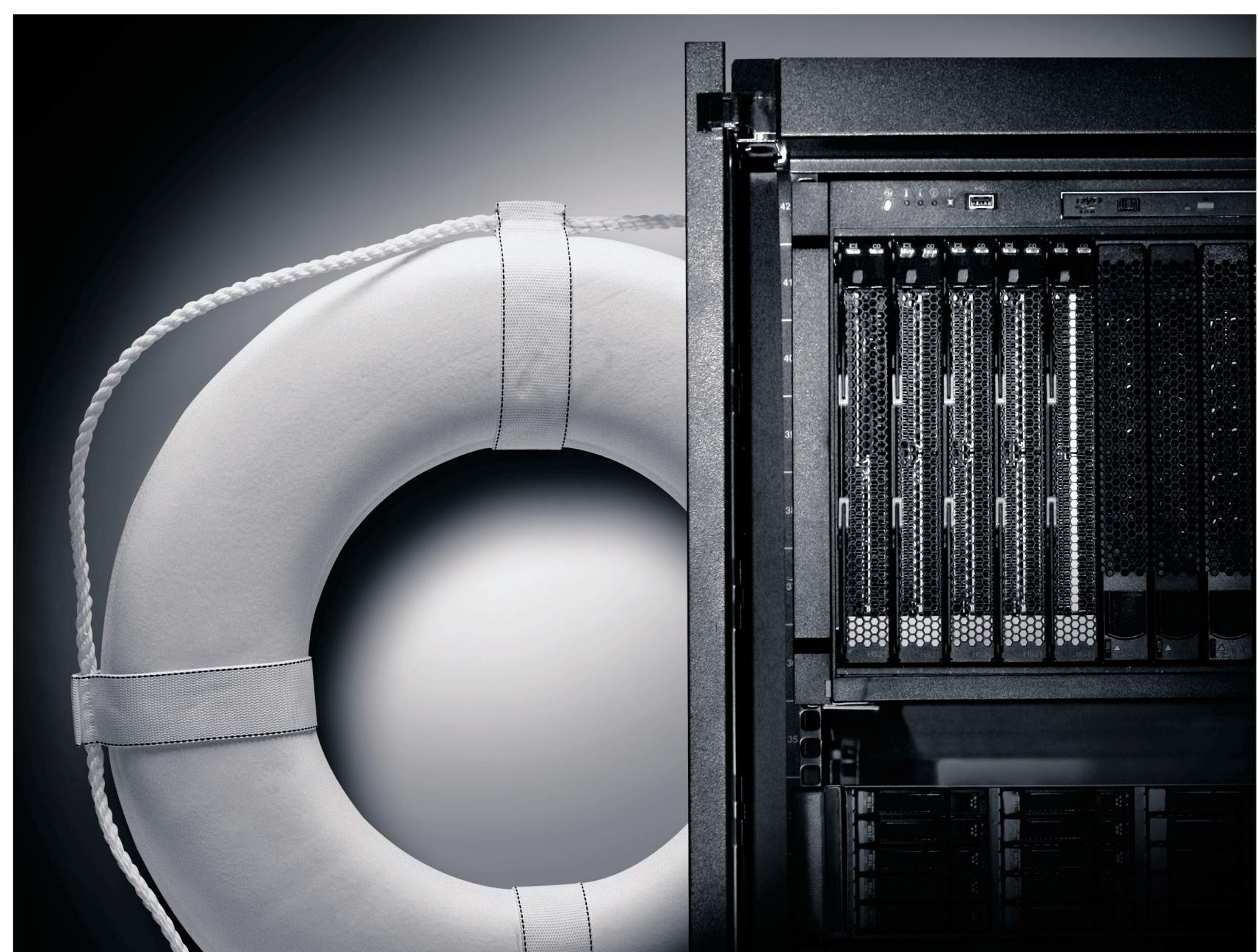
Info-Tech Research Group. "This isn't necessarily about finding the right people; the real stress is on ensuring the right duties are being fulfilled. It's about having the right roles and responsibilities and ensuring everyone knows what actions have been assigned to them. When designing the disaster recovery plan, set objective and clear trigger points. Don't allow reactions to rest on an individual's subjective opinion when you are risking the organization's safety."

## ✓ Test Your Data Recovery Solutions

Once you have your data recovery plan and response team in place, you

can focus on your recovery solutions. For instance, you may opt for physical backup on tapes or hard drives, but you may also want to institute virtual alternatives. However, you can't just set these solutions and forget them. As with any other system in the data center, you need to regularly test them to make sure they are performing at the highest possible level.

"The No. 1 thing companies can do to avoid major failures with their data recovery solutions is to periodically test them well before they ever have a problem," says James Richards, chief operations officer at Stronghold Data ([www.strongholddata.com](http://www.strongholddata.com)). "I can't tell you



how many people have come to us after a disaster thinking that they were doing the right procedures to protect themselves and nothing was even there to recover with. Companies need to have a clear understanding of what their system will do for them when disaster strikes and they also need to know what it won't do for them."

**✓ Invest In Offsite Data Recovery**

In some situations, onsite data recovery solutions simply aren't enough for data centers. Similar to how you can set up a colocation agreement to house equipment and infrastructure in an offsite facility, you

can also back up your data to a third-party data center.

"Being here in Joplin, Mo., we experienced one of the most disastrous EF5 tornadoes in the history of the United States," Richards says. "Our customers' DR systems were located miles away in our underground data center and were completely available before, during, and after the tornado. Our customers weren't trying to recover their DR solutions from crumpled-up buildings. They knew they were secure in a fortified facility."

Richards recommends only backing up your most mission-critical data at offsite facilities because you're typically charged per gigabyte of storage. You can create

a priority list of your data to help save money on offsite storage while also making sure data is safely backed up and ready for access during a disaster.

**✓ Have A Data Recovery Expert Lined Up Just In Case**

Despite your best preparations, there's always a chance you could experience both a data failure and a data recovery systems failure at the same time, which is why you should consider having a data recovery expert lined up and ready to go. "In the event of a data loss situation, users will typically shop around and look for options," says Abhik Mitra, product manager for data recovery at Kroll Ontrack ([www.krollontrack.com](http://www.krollontrack.com)). "Having a relationship in place ahead of time and knowing who to turn to is absolutely key."

Mitra stresses that data loss is "hard to predict" and "hits companies despite them having vast recovery plans in place." In many situations, companies are simply blindsided by the unexpected and aren't sure how to react. But if you have a plan, regularly test your data recovery solutions, and have a third-party expert ready, then you have a much better chance of surviving data failure and getting your data back with as little downtime as possible. □

### ✓ Be Prepared, Be Aware

Although it's nearly impossible to predict every possible cause of data failure, it's still important to come up with a list of possibilities to make sure you are prepared for almost anything, especially human error. "It can be a virus that may have taken over the system and corrupted it entirely," says Abhik Mitra, product manager for data recovery at Kroll Ontrack ([www.krollontrack.com](http://www.krollontrack.com)). "It could be a file-level corruption, something internal with the hard drive, wear and tear over time, or sometimes it's plain and simple human error. People will make mistakes and technology is not meant to fail, but sometimes it does. There is always a human being behind it running the operation, and so the scope for error is always there."

### ✓ Take A Tiered Approach

When it comes to data recovery, the more varied your approach, the better. It won't serve your data recovery plan well to focus solely on onsite recovery, and it won't serve your bottom line to invest solely in offsite. "When you have the option, you need to think of data recovery in a tiered approach," says James Richards, chief operations officer at Stronghold Data ([www.strongholddata.com](http://www.strongholddata.com)). "Consider offsite, onsite, and a combination of both resources. We like to approach DR from various levels, such as file-level loss, share-level loss, server-level loss, server room loss, facility loss. You should implement a multi-tier approach, which will provide restoration for all types of disasters."

### BONUS TIPS:

#### ✓ Assess & Refine Your Data Recovery Plan

Victoria Moore, research analyst at Info-Tech Research Group, says that sometimes you can't fully test your data recovery plan until a data loss event occurs. "Reviewing and refining should occur post testing, and an actual disaster is as complete a DR test as you can get," she says. "If your organization ever does need to run through their DR plan, a thorough post-mortem should be performed to identify and improve any weak points."

#### ✓ Consider The Cloud

Moore says a tiered approach to data backup and recovery is important but some companies may benefit from cloud more than full offsite recovery. "If the company is large enough, an offsite facility might be warranted, but for many organizations, backing up to the cloud is an economical alternative to funding their own offsite facility," she says.

## SIX QUICK TIPS

# Get Started With Environmental Monitoring

Identify Your Needs To Find The Best Solution

**HOW DEVASTATING CAN** heat, humidity, airflow, electricity, and other environmental factors be to a data center? Enough that environmental monitoring should be on the minds of all data center professionals.

"Environmental monitoring should be on the same level of importance as running backups, antivirus software, or a firewall—you absolutely have to have it," says Harry Schechter, founder and CEO of Temperature@lert (866/524-3540; [www.temperaturealert.com](http://www.temperaturealert.com)). "Even if the AC never goes out, high ambient temperatures can significantly shorten the life of equipment."

Michael Sigourney, senior product specialist at AVTECH (888/220-6700; [www.avtech.com](http://www.avtech.com)), sees environmental monitoring as the responsible thing to do in today's real-time, online world. "History

shows that the invisible hand of Mother Nature calls on all of us sooner or later, and when that occurs, she doesn't send a calling card in advance," he says. Read on for more on starting an environmental monitoring program.

## ✓ Just Do It

Room entry, temperature, smoke, power, water, humidity, and airflow are issues arguably every enterprise should monitor. Sigourney advises to first focus on "where the most expensive IT equipment is located," especially supporting high-level functions that the organization can't afford to lose. Sigourney also stresses that different types of facilities typically require different levels of monitoring or sensor types. A successful environmental monitoring implementation requires understanding the physical facility

and equipment layout and knowing where threats are likely to occur or have occurred previously, he says. Also important are understanding desired objectives, creating a plan and working it, making adjustments as events occur or equipment is added, and periodically testing monitors.

Although enterprises "typically start their focus where they have the most pain or based on the latest disaster" and "the IT footprint is unique for every organization," Sigourney says, temperature is "something everyone needs and wants to monitor. The thing that is constant and heard every day is the tone of remorse that people have for not installing monitors earlier."

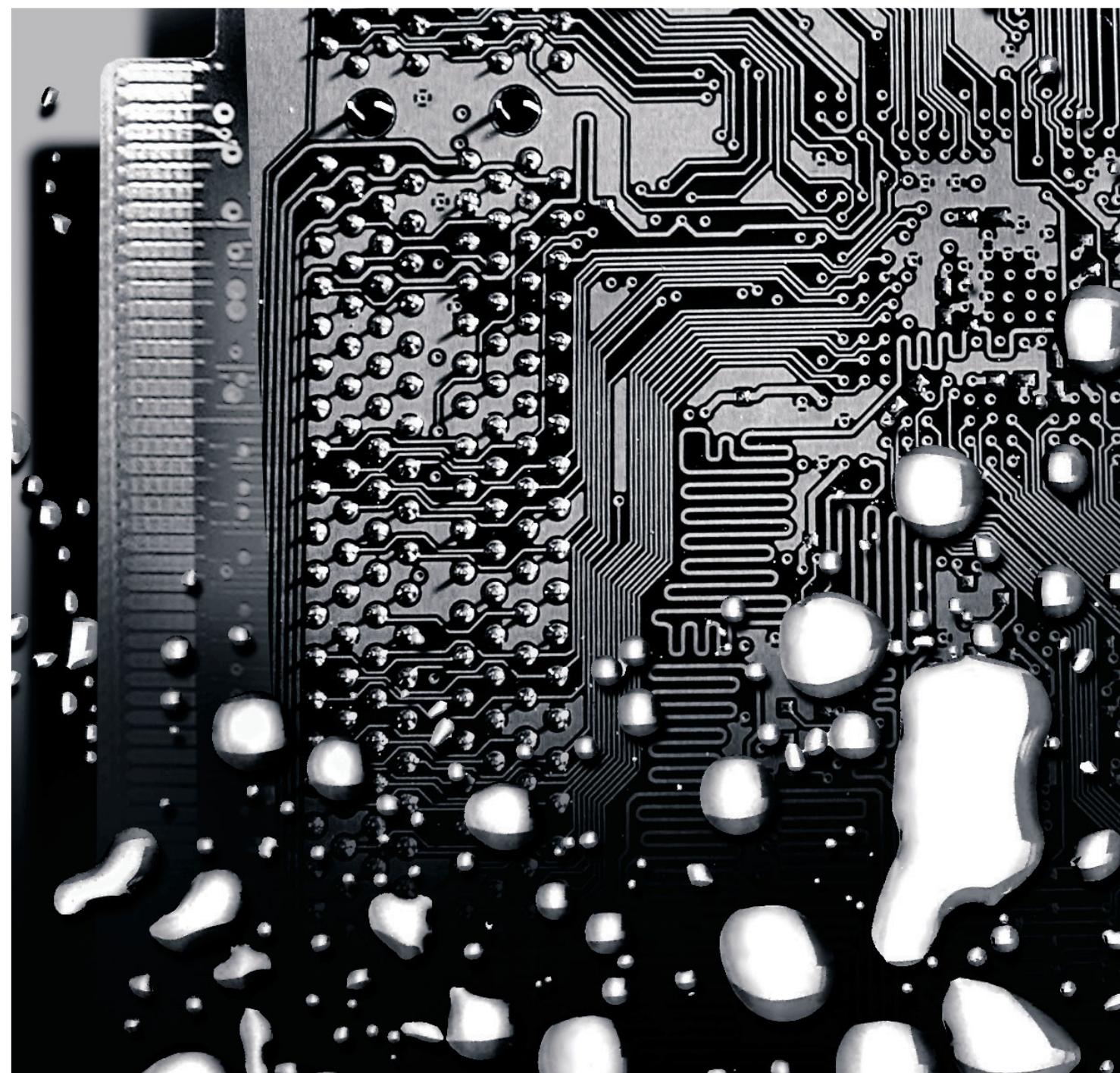
## ✓ Start Small

For data centers that have no environmental monitoring system in place, you

may be surprised what you learn when you start watching your facility and infrastructure more closely, says Bob Douglass, vice president of sales and marketing at Sensaphone (877/373-2700; [www.sensaphone.com](http://www.sensaphone.com)). He advises starting small with the main concerns such as temperature, humidity, and power for the overall room. Then watch the trends from time of day and from changes and relocations of equipment.

"This learning process will help you to understand if you need to watch the cooling source more closely, or watch the heat concentrations within each cabinet more closely, or something else that you are observing. Expand slowly and let common sense be your guide," Douglass says.

That's why it's important to choose a solution that can grow with your needs,



says Temperature@lert's Schechter. "We're constantly adding memory and storage to our server systems. So, it just makes sense to get an environmental product that can connect to a multitude of sensors and provide various integration options," he says.

Rather than purchasing a full-blown, top-of-the-line system to start, consider starting with an entry-level product that can be expanded as time goes on and your enterprise's needs change.

#### **✓ Pick The Right Solution For Your Enterprise's Needs**

Although starting with an entry-level product that can expand with your needs is one solid approach, it's essential that you fully understand your environmental monitoring needs and find a product

that will meet all those current needs, says Christina Ihfe, sales manager with RLE Technologies ([www.rletech.com](http://www.rletech.com)). "Assess your monitoring needs before you buy environmental monitoring equipment. Make sure the equipment is robust enough to meet your monitoring needs; don't limit your needs to fit the capabilities of the equipment."

When it comes to identifying your needs, most monitoring decisions are influenced by previous failures, says Sensaphone's Douglass.

"This is not always the best path, but it's human nature to react and make sure the same thing doesn't happen again. No matter what problems have occurred in the past, you should always evaluate, and reevaluate, all of the primary sources for trouble," he says. This includes

overall room temperature, operation and efficiency of cooling systems, humidity, temperatures within racks, power supply at various stages and sources, changes in power consumption, water on the floor, airflow problems, and physical security, he says.

"Most facilities are very dynamic and change frequently, so it just makes sense to keep reevaluating your potential problem areas. Since every facility is different, the only true guide is research and common sense."

#### **✓ Go Beyond The Room**

Because temperatures change in IT environments by the rack and row, Sigourney says, it's critical to monitor temperatures in more locations within the room. Distributed telecom closets

or building facilities housing HVAC equipment are frequently overlooked areas. "Managers need to learn that having one temperature sensor in the room provides a false confidence that will surely get them in trouble; it's just a matter of time, and the clock is ticking," he says.

Cam Rogers, vice president of domestic and international sales at RLE Technologies ([www.rletech.com](http://www.rletech.com)), warns data center managers to keep options open when it comes to sensors. "Make sure the system is flexible and can accept third-party sensors," he says. "This allows you to integrate sensors you may already have onsite and source/integrate sensors that may be more specific to your needs. Systems that require proprietary sensors or connectors will only limit your options." **P**

#### **✓ Don't Forget About Water & Humidity Detection**

Michael Sigourney, senior product specialist at AVTECH (888/220-6700; [www.avtech.com](http://www.avtech.com)), says water damage from melting snow or rain coming through cracks dripping onto expensive electronic equipment can be a big surprise to IT. "Know your building and prepare for the unexpected. Repair older roofs or move equipment to safe locations," he says. Flooding, meanwhile, is a recurring threat to computer rooms that aren't designed to be computer rooms, he says. "This means adjoining restrooms or kitchenettes pose a threat if plumbing problems occur, and they will from time to time, allowing water to flow under walls and come into contact with cables and equipment."

#### **✓ Contain Cool Air With Curtains**

Michael Sigourney, senior product specialist at AVTECH (888/220-6700; [www.avtech.com](http://www.avtech.com)), says if the computer room or data center has exterior windows, install curtains to insulate against thermal loss. Close the curtains when temps are high outside and open them when cool. Depending on room size, window size, and the angle that the windows face the sun, "you may be able to harness free cooling or at least reduce the need for additional cooling during winter months by simply positioning the curtains effectively for the weather," he says.

#### **BONUS TIPS:**

##### **✓ Buy A Reliable System**

The main reason for having environmental monitoring is to find a problem quickly when something like power or cooling has failed, says Bob Douglass, vice president of sales and marketing at Sensaphone (877/373-2700; [www.sensaphone.com](http://www.sensaphone.com)). "Your monitoring system won't be of much help to you unless it is more reliable than your other systems. There are many types of systems out there, but your focus should be on a provider that is reliable with proven experience. Avoid dependencies and embrace redundancy, he says."

##### **✓ Maintain & Test Your System**

Harry Schechter, founder and CEO of Temperature@lert (866/524-3540; [www.temperaturealert.com](http://www.temperaturealert.com)), says that environmental monitoring needs to be elevated to the same importance level as backups, antivirus, and software updates. As such, be sure to include environmental monitoring in a normal daily or weekly maintenance and testing routine. "The most common pitfall to avoid is incorrectly set thresholds that generate false alarms. Like the boy who cried wolf, these alarms will quickly become ignored making a real problem tough to notice," he says.

## HOW TO

# Rethink Your Position On Blade Servers

Determine If It's Time To Bring A Blade Server Aboard

**IT'S POSSIBLE THAT WHEN** blade servers first hit the scene, you were intrigued by their promise to pack more processing power into less space and the consolidation abilities available. For various reasons, including compatibility and pricing concerns, many enterprises chose not to initially implement blade solutions. In these areas and others, blade servers have made strides to the point that adopting a solution warrants reconsideration.

## Note The Changes

Today's blade solutions are based on Intel and AMD x86 processors, something Charles King, principal analyst at Pund-IT, says translates into greatly improved system performance as those architectures have evolved. "In addition, with x86 systems driving so much growth in virtualization and cloud, blade-based solutions are playing greater roles in those markets," King

says. "In fact, several vendors are delivering blade-based solutions designed specifically for cloud and virtualization applications."

John Sloan, lead research analyst at Info-Tech Research Group, says that when blade servers were originally introduced, their primary use was seen as being in high-performance computing clusters. "Their economical form factor meant a high-performance cluster (a cluster of synchronized servers running the same application) would have a smaller data center footprint. Limitations on processing, memory, and I/O made them less ideal for consolidation and virtualization," he says. Blade servers also suffered from problems related to heat density, so "you could have a smaller footprint, but your data center cooling requirements would go up," he says.

In recent years, however, Sloan says in addition to using powerful multicore x86 processors, blade servers have featured

greater memory accessing ability and greater I/O bandwidth, traits enabling blades to be solid virtualization and consolidation platforms with strong market growth. "Blade popularity grew exponentially between 2006 and 2010, where there was a 400% increase in blade server adoption," Sloan says. In 2009/10, he says, converged systems based on blades became the new market direction.

## Why You Should Reconsider

Initially, enterprises said no to blade servers for various reasons. Sloan says ultimately purchasing considerations come down capacity, scale, and total cost factors. "How much processing do you need? In our cost modeling, we found that blades only became cost-effective once you had more than seven or eight blades in a chassis (depending on the vendor)," Sloan says. From a TCO perspective, he says, buying

## Key Points

- Blade solutions have improved in areas of processing, memory, and I/O.
- Current blade servers include multicore x86 processors that can power virtualization and cloud computing applications.
- One current trend in blade solutions is packaging servers with integrated storage and networking components.

a blade rack/chassis and only two or three blades was more expensive than buying two or three rack-mounted servers. Thus, if an enterprise were consolidating servers and virtualizing them and had the option of hosting a few dozen servers or two or three traditional servers with shared storage, it likely didn't need blades.



Today, Sloan says, server considerations are "still about capacity, scale, and total cost." Now, however, vendors have mini-blade products featuring essentially a single rack of six or so blades and integrated shared storage. Additionally, he says, there may be projects that necessitate suddenly adding a lot more capacity. "For example, even a smaller company might find it needs to host hundreds of virtual machines for a new VDI (virtual desktop infrastructure) initiative," he says. Various vendors have been taking advantage of these requirements with package blade systems for VDI, he says.

King says given today's continuing economic pressures, many companies are seeking ways to lower IT costs. Because blade systems are suitable for various efficiency scenarios, including system/application consolidation, cloud deployments, and downsizing IT facilities, he says, they deserve to be evaluated.

## Seeking Vendors

When seeking out vendors, King advises sticking with vendors that have a history in developing blade solutions. "Fortunately, blade systems have been around for so long now that they've been battle-tested across a range of scenarios and industries," King says. "That means there's lots of data available for companies to chew on." He specifically suggests getting a vendor's pitch for both blade offerings and similar, non-blade solutions, as well as success stories from customers whose situations are similar to yours. "Finally, comparison shop. If you're looking for x86-based blades, there are a lot of solutions to choose from."

Sloan says that most differentiation in blade servers doesn't come from the blades themselves but from the systems they plug into, including the chassis and the "broader converged platform for which they are the

processing engines.” Unlike standalone x86 servers, which are “standardized and open” in the sense they’re all based on the same internal architecture, he says, blade systems are proprietary. That said, Sloan says there are still onboard factors to consider, including how much memory a single blade can address, something important for efficiently hosting virtual machines.

### Dig Deeper

Beyond basic evaluations and comparisons, determine the management tools the vendor integrates and the advanced features the solution itself supports. Advanced features and functions Info-Tech evaluated for a recent blade vendor overlook included if a solution's architecture extended to a non-x86 foundation so that the system can include x86 and non-x86 processors. Other evaluations addressed convergence over 10GbE, dynamic power management, memory extension technology,

and network port virtualization. Sloan also suggests evaluating for hardware redundancy (“blade clusters are redundant across blades, but how about onboard redundancy, as in dual power supplies per blade?”) and layer ownership (“does the blade vendor also own the other parts of converged infrastructure, such as network and storage assets?”).

King says much of the market is moving to a model in which solutions combine servers, storage, and networking components into a "deeply integrated whole." Some systems, he says, are optimized for specific business applications and workloads, but in many cases "they are extending the approach and form factor pioneered by blade-based systems. In other words, blade products have shifted from being a clever design to becoming an industry trend." This, he says, testifies to the technology maturity and should assure potential customers that blade investments should hold their value. □

Top Tips

- ✓ **Think long-term.** Charles King, principal analyst at Pund-IT, says premium pricing has always been the biggest barrier to acquiring a blade system. "The argument has been that blade systems allow customers to save so much on management, support, and facilities expenses that the higher cost is justified," he says. But convincing buyers to take a short-term price hit for long-term gain has been tough, he says.
  - ✓ **Avoid per-blade cost comparisons.** John Sloan, lead research analyst at Info-Tech Research Group, says when making budgeting considerations for blade servers, consider the whole blade system (blade, chassis, management, etc.) in the TCO. "Per-blade cost comparisons are not very useful," he says.
  - ✓ **Know the finer support details.** When planning support needs for a new blade system, determine how support is delivered, who will show up if there's a problem, and the proximity of replacement parts, Sloan says.



# Action Plan

- Ask questions concerning capacity, scale, and total cost to determine cost-effectiveness.
  - Ensure the current infrastructure is compatible with the solution that's being considered.
  - Compare vendors, asking for bids for blade and similar non-blade solutions.
  - Compare blade server against blade server but also blade system against blade system.
  - Determine the management tools the vendor incorporates.
  - Verify the support included, how it's provided, and training and/or certification required

## Get Started

Beyond comparing vendors and ensuring compatibility with existing equipment, enterprises should evaluate IT staff. For enterprises deploying their initial blade system, Pund-IT principal analyst Charles King advises evaluating the system and determining if it will need additional management and service training and/or certification. "That could be a major issue that spells the difference between what seems like a great deal and a technological money pit," he says.

## SIX QUICK TIPS

# Eliminate Network Data Bandwidth Hogs

View & Control How Users & Applications Are Using Your Network

**EVEN IF YOUR ENTERPRISE HAS** adequate bandwidth to satisfy employee and customer needs, it's important that network administrators have the ability to monitor how employees, customers, and various applications are using that bandwidth in order to monitor and set thresholds on usage should the need arise. The following tips can help in recognizing network bandwidth hogs and controlling their bandwidth habits.

## ✓ Measure To Effectively Manage

Bob Laliberte, Enterprise Strategy Group senior analyst, says to "effectively manage something, you need to measure it." In terms of network bandwidth, without visibility it's not only impossible to manage it, "worse, when there is a problem, you may not know what caused it, and it will take much longer

to shut down," he says. Acquiring a tool or solution that provides requisite insight into the network, he says, is the first step toward enabling administrators to be able to decide necessary actions possibly required such as QoS or blocking access to sites or certain employees.

More enterprises are keeping business-related network services available 24/7 for customers, employees, and remote offices, say Manny Alvarez, general manager at Alvaco Networks (407/574-2017; [www.alvaco.com](http://www.alvaco.com)), and Clarence Ki, director of software engineering at Cell Technology ([www.cell-technology.net](http://www.cell-technology.net)). And, on top of that, enterprises are seeking minimum network connection costs and resources to maintain network availability without WAN link outages. "Therefore, the type of bandwidth usage and how to manage this bandwidth effectively is critical," Alvarez says.

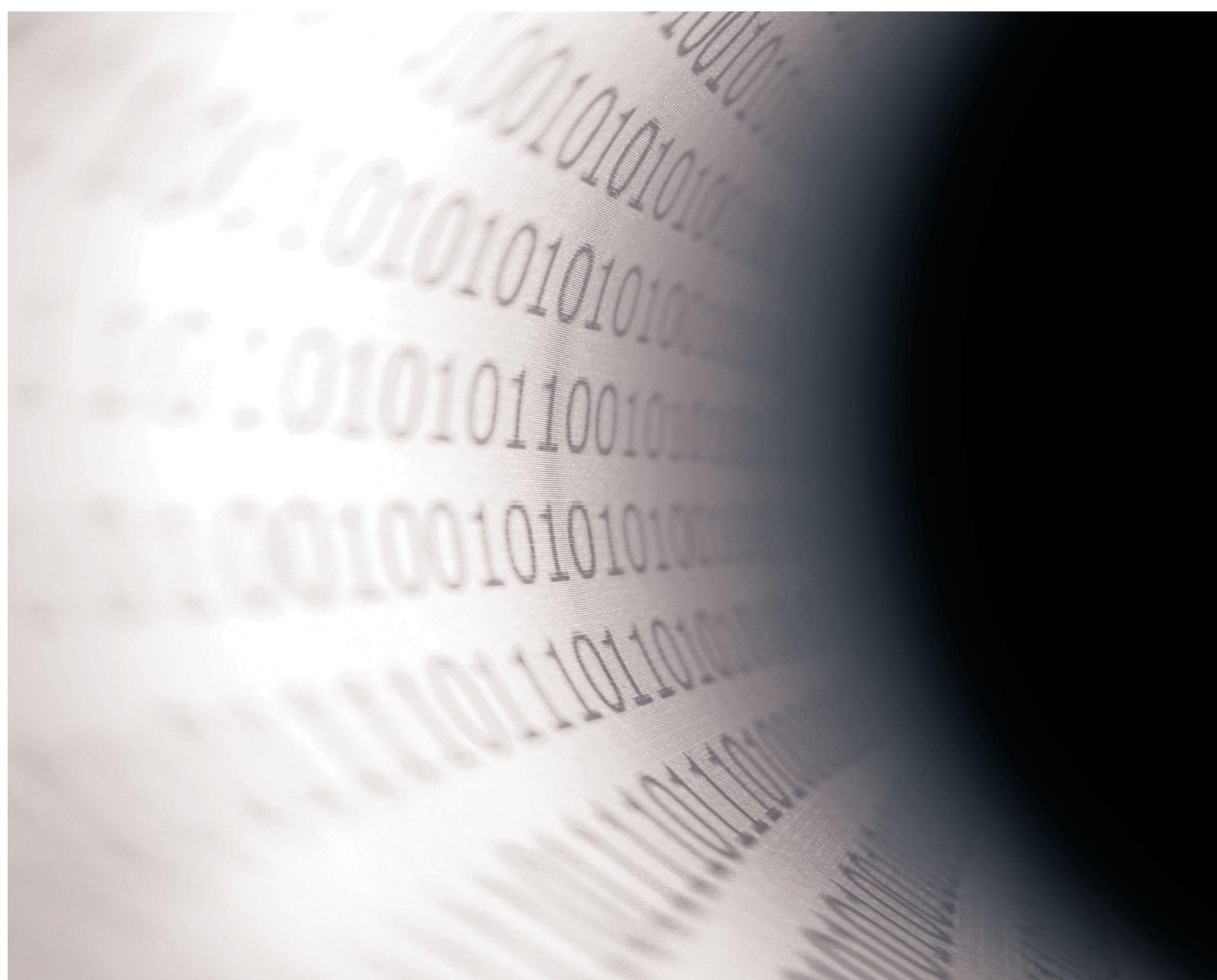
## ✓ Inform Yourself

A lack of insight into network bandwidth usage leaves enterprises without information regarding legitimate vs. illegitimate bandwidth usage. Alvarez and Ki advise monitoring bandwidth usage during peak and off-peak hours, something that will provide important data for network planning and service allocation. Acquiring data related to traffic flow will help identify heavy network bandwidth users so administrators can enforce management actions. Data gathered through packet inspection will help in detecting possible intruders inside and outside the network, Alvarez and Ki say. "By collecting that packet information, a security advisor is able to provide recommendations to the SME to reduce or prevent the possibility of data leakage and DDoS," Alvarez says.

Laliberte says IT organizations of all sizes are being inundated with smartphones and tablets due to the popularity of such devices and the related consumerization of IT. As employees use the corporate WLAN, he says, "organizations should be cognizant of what they're accessing." Although mobile devices can be "great productivity-enhancing tools," he says, "they can also be used to update Facebook statuses and/or play online games. So having visibility will be important to better manage this access."

## ✓ Prioritize, Stabilize & Optimize

Prioritizing network traffic/services into different classes, Alvarez and Ki say, is essential. "Higher priority traffic, such as VoIP and videoconference, can be guaranteed to be delivered with low latency and high quality," Alvarez says. "Low-priority



traffic, such as Web surfing and email, can be allocated with lower delivery priority. SMEs can maintain the bandwidth usage more efficiently and effectively inside the network by managing the QoS."

Alvarez and Ki also recommend providing stable and reliable content. "In some cases, SMEs deliver content through their internal Web service or media server. By knowing the bandwidth usage of the SME's network, they can plan a proper network bandwidth to maintain the high quality of content delivery service to their customers," Alvarez says.

Depending on bandwidth usage and traffic behavior, Alvarez and Ki say, enterprises may be able to select a more suitable network service package from different ISPs. If Internet traffic is a bandwidth-demanding application, for example, a company can obtain less expensive

services (ADSL or cable, for example) to provide higher bandwidth with perhaps lower stability Internet service, Alvarez and Ki say. If the majority of traffic is a time-critical or real-time application, companies can acquire higher stability, low-latency service such as fiber, MPLS, VPN, or leased line.

"Both of those network services can also coexist in the SME network for all applications to be delivered by connecting an Internet load balancer to all service providers," Alvarez says. "The SME can optimize its cost to manage different traffic into different service providers."

#### ✓ *Implement A Solution*

Deciding what bandwidth thresholds are appropriate to enact is up to individual organizations, Laliberte says, but factors may include how much bandwidth overall

is available and how much is needed for critical apps.

"Ideally, policies would be put in place to ensure all mission-critical apps and processes get the bandwidth that's required, then what is left over can be used for other purposes," he says. Policies might allow the marketing department access to social networks to run campaigns but restrict access to those sites for other departments. "In universities that I have talked to, bandwidth during the day is allocated between faculty and students, but at night more bandwidth is shifted back to the students," he says.

Laliberte says available solutions include those that can determine the traffic coming and going and that can "help establish QoS down to an individual device," he says. In addition, organizations can use firewalls to determine "top talkers," which is a "more manual process," Laliberte says.

Alvarez and Ki say determining which thresholds to set depends on if there's a service charge in place for bandwidth and for critical or non-critical applications. Bandwidth or traffic monitoring, however, is the "first step to determine the control of bandwidth," Alvarez says.

Available solutions for controlling bandwidth usage, Alvarez and Ki say, include deploying security equipment such as a firewall, IDS, IPS, or UTM. Specifically, a firewall can block unwanted access between the Internet, DMZ, and intranet, Alvarez says, while an IDS/IPS/UTM device can detect and block possible attacks, intrusions, viruses, and data leakages. Overall, "bandwidth management equipment can limit and manage the activity of heavy users and prevent DoS/DDoS attacks," Alvarez says. P

#### ✓ *Enlist Bandwidth Management, Load Balancing*

Manny Alvarez, general manager at Alvaco Networks (407/574-2017; [www.alvaco.com](http://www.alvaco.com)), says enlisting bandwidth management and load balancing equipment are two measures related to bandwidth usage that are easy to implement. Bandwidth management equipment, he says, can efficiently manage and control usage, applications, and time-critical traffic. Load balancing equipment can help plan and allocate various bandwidth/traffic or applications in the network with "aggregate multiples of broadband network access."

#### ✓ *Beware Of Obstacles*

Manny Alvarez, general manager at Alvaco Networks (407/574-2017; [www.alvaco.com](http://www.alvaco.com)), cites network design and technical support resources as two obstacles enterprises will likely encounter in identifying heavy bandwidth users. "SMEs should plan a good network design, including network equipment monitoring and management, as well as control bandwidth usage," he says. "Technical resources and engineers are also important for identifying and analyzing network data. In-house network engineers (IT managers) or a subcontractor should be in charge of these tasks."

#### BONUS TIPS:

##### ✓ *Go With The Flow*

One tool for monitoring network traffic is using a flow monitoring technology such as sFlow, say Manny Alvarez, general manager at Alvaco Networks (407/574-2017; [www.alvaco.com](http://www.alvaco.com)), and Clarence Ki, director of software engineering at Cell Technology ([www.cell-technology.net](http://www.cell-technology.net)). Described as an industry standard, sFlow monitors high-speed switched networks and "gives complete visibility into the use of networks" to enable "performance optimization, accounting/billing for usage, and defense security threats." Alvarez says, "This kind of traffic flow tool provides some statistics about the bandwidth usage of users and applications inside a network."

##### ✓ *Educate The Masses*

One easy way to control bandwidth usage, says Enterprise Strategy Group senior analyst Bob Laliberte, is educating employees on bandwidth-related policies and why they're important to follow. For example, education can include detailing the business impact of a critical app going down "because too many people are watching Netflix at lunch," he says.

# *Short On Time?*

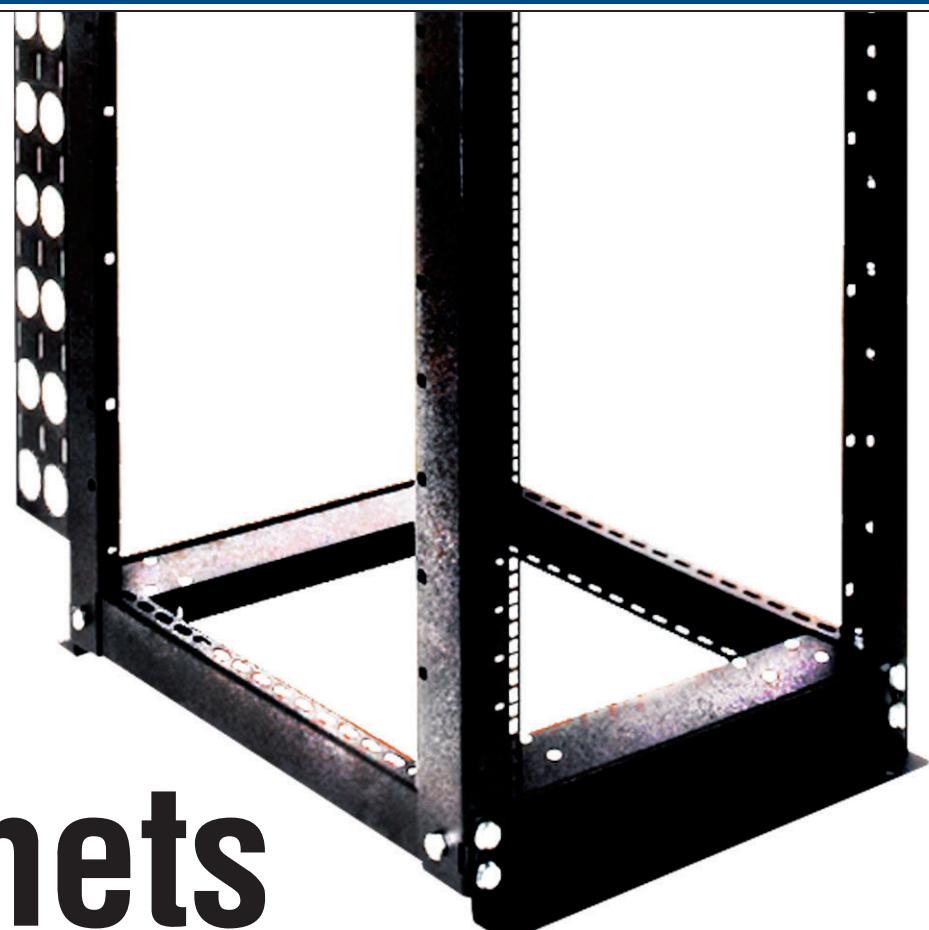
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**BUYING TIPS:**

# Data Center Racks & Cabinets



**RACKS AND CABINETS** are built to hold and protect every piece of equipment that runs your data center. Because of that, the decision of which racks and cabinets to purchase shouldn't be hastily made. Instead, you should focus on the features most important to your company and ensure they will fulfill your needs for years to come.

#### ✓ *Know What's Currently On The Market*

The first thing you should do when looking at racks and cabinets is research what's currently on the market. Companies offer full-sized 42U, midsized 26U, and 12U cabinets as well as racks with heights of 30 to 84 inches and widths of 24 to 36 inches.

Eli E. Hertz, CEO and president of Hergo (888/222-7270; [www.hergo.com](http://www.hergo.com)), says you should look for potential add-on items, such as overhead storage compartments, power and cable management solutions, and back and side panels. Different sized racks and cabinets paired with additional solutions can help you design a product that's perfect for your data center.

#### ✓ *Pinpoint Your Needs*

Once you know what products and configurations are available, look at the types of physical features you need for your specific environmental needs.

"Establish what you need the cabinet to do," says Susan Wynne, senior sourcing specialist for Rackmount Solutions (866/207-6631; [www.rackmoundsolutions.net](http://www.rackmoundsolutions.net)). "If the equipment is noisy, you may want a sound reduction cabinet. If the environment is dirty, you may need a filtered cabinet. Even the area of the country is important and you may need an air-conditioned or NEBS cabinet."

There are many other considerations you must make, including whether you have a sprinkler-based fire suppression system that requires NEMA 12 certified cabinets that keep out moisture, Wynne says. You should also consider built-in security measures, such as locked cages or other alternatives, if there is a lot of traffic in and out of your data center.

#### ✓ *Check The Vendor*

Hertz says that a cabinet or rack purchase is significant and so the decision of which vendor to buy from is just as important. "You need to make sure that the supplier they have chosen has been in business long enough to have an established reputation in the market," he says.

Hertz says companies should be able to "grill the supplier on what they are actually going to be getting," and the vendor should be able to answer those questions by knowing "the product from nuts to bolts." Think of the vendor as a partner in the purchasing process and make sure it gives you enough information to make the best possible decision.

#### ✓ *Get The Right Fit*

In most cases, you've already decided which pieces of equipment to buy for your data center before you start shopping for the racks and cabinets to store them in. It's a great opportunity to measure each piece and come up with a mock configuration for how it will fit into the rack or cabinet.

"This ensures the cabinet is tall enough, wide enough, and deep enough to handle the longest piece of equipment to be populated into the cabinet," Wynne says.

But don't let internal space be your only focus, because the amount of space the rack or cabinet takes up is equally important. "Make sure the outside dimensions of the cabinet will fit in the designated location," she says. Whether you are purchasing multiple racks and cabinets to fill a brand new data center or buying one to fit into an existing setup, it's important to know every dimension. And make sure you leave adequate space for expansion in the future. If you don't, you could get stuck with a cramped and inefficient data center with no room for evolution. □

## BUYERS' CHECKLIST

- ✓ Is cable management built in, or does the rack or cabinet leave adequate space to neatly route cables?
- ✓ Does the rack/cabinet provide PDU mounting options?
- ✓ Does the cabinet include PDU mounting brackets?
- ✓ Does the equipment you're mounting require tapped or M6 holes?
- ✓ Will you need to disassemble the rack/cabinet to get it in the room?
- ✓ Is the cabinet lockable to prevent potential security issues?

## KEY TERMS

### M6 holes.

Square holes common with rackmount equipment and server cabinets; they can be adjusted to a round hole with a cage nut.

### Rackmount units (RMU).

Cabinets and racks are measured in rackmount units, with each RMU, or U, equivalent to 1.75 inches.

# BUYING TIPS: KVMs



**THERE'S LITTLE DOUBT** that KVMs offer plenty of options. Brett Femrite, Rackmount Solutions director of business development (866/207-6631; [www.rackmountsolutions.net](http://www.rackmountsolutions.net)), says models include simple desktop options that control a handful of computers up to enterprise-level, IP-based KVMs with integrated matrix switching that let multiple users simultaneously access different devices.

#### ✓ Consider Security

Buying a KVM with secure IP remote user access is essential for reducing manpower and negating the need for onsite operation by enabling administrators to gain BIOS-level access to servers, says Anthony Yim, general manager of Austin Hughes Solutions Inc. (510/794-2888; [www.austin-hughes.com](http://www.austin-hughes.com)).

For small to midsized enterprises, Femrite says, another security-related feature worth considering is automatic time out, which disconnects users after a specified period of inactivity. Another priority feature for data centers with multiple users accessing the enterprise's devices is permissions-based access rights, which grants specific users access to only the devices and administration levels they need.

#### ✓ Factor In Compatibility

Be sure to account for compatibility, Femrite says. Determine the number of devices you want to connect, hardware devices you'll connect to it (mouse, keyboard, monitor), and the connection types

(USB, PS/2) you need. Compatibility with the monitor you'll connect the KVM to (DVI or VGA) is also essential.

Some KVMs integrate the switch and a slide-out monitor/keyboard combo in an all-in-one unit that only uses 1U of rack space, a convenient option when mounting a KVM in a rack.

#### ✓ Check For Devices & Users

KVMs have a limited amount of servers and devices they can directly control. To that end, Will Beene, rack specialist and technical account manager at Rack Solutions (888/903-7225; [www.racksolutions.com](http://www.racksolutions.com)), recommends that small to midsized enterprises ask how many users can be supported both locally and remotely. KVMs are offered in a variety of port densities, so you should be able to find one that perfectly fits your needs.

You can reduce KVM hardware expenditure and simplify management with a KVM that offers simultaneous multi-user access from different locations on devices connected to the same KVM switch, Yim says.

#### ✓ Determine The Distance

Determine the maximum distance you need to connect devices to the KVM. "If further than approximately 25 feet, you should opt for a CAT5 cable vs. the standard KVM cable kit," Femrite says. Femrite notes that if the servers are too far away for the cabling to reach, you may need to invest in a KVM extender that converts the KVM signals and allows them to travel over a greater distance.

You could also invest in KVM over IP. KVM over IP allows for IT staff to control

servers from anywhere using an Internet connection, which is convenient if the network administrator works in a location away from the servers or will need to check on something at odd hours of the night. The KVM over IP switch will also feature an encryption protocol that will help secure the data you send over the network.

"KVM over IP allows the servers to be further away from the KVM switch; however, Service Access Modules (SAMs) are required," Beene says. "You have to weigh the cost vs. the benefits. In large organizations with distributed systems, KVM over IP is an easy method of administration and management."

For companies that are not controlling a large number of distributed devices, Femrite says, consider built-in remote access for connecting the KVM to the network and managing devices from anywhere.

Yim adds that new CAT6 KVMs can minimize distance-related problems as a CAT6 cable with interface dongle can support up to 130 feet without signal weakness.

#### ✓ Plan For The Future

Be sure to factor in future additions or purchase a KVM that can daisy chain or cascade to avoid having stranded assets you outgrow, Femrite says. Pay special attention to the cost, benefits, and expandability of the KVM switch, especially if you plan on upgrading in the near future.

"Organizations that administer and manage large numbers of servers will benefit from being able to cascade KVM switches as they grow and expand," Beene says. □

## KEY TERMS

### Cascading.

Connecting KVM switches together in a chain by attaching one switch to the computer port of another.

### Converter.

An add-on device that converts the KVM signal from one platform, such as Windows, to another, such as Apple.

### Emulation.

A switch's ability to imitate a signal so that the PC thinks that it's directly connected to the KVM.

### KVM extender.

Converts the KVM signal to travel over a greater distance than it would have previously, eliminating the need to control the servers from the server room.

### KVM sharing.

Enables multiple users to access the same KVM.

## BUYERS' CHECKLIST

Anthony Yim, general manager of Austin Hughes Solutions Inc. (510/794-2888; [www.austin-hughes.com](http://www.austin-hughes.com)) offers this list of features to look for:

- ✓ Do you need traditional DB-15 cables or CAT6 cables with an interface dongle?
- ✓ Does the KVM support secure IP remote access?
- ✓ Do you need a single local console or multiple consoles with IP remote access features?
- ✓ Will the KVM be standalone or integrated with an LCD keyboard drawer?
- ✓ Will you have a single user or concurrent users?
- ✓ Does it have multiplatform connectivity so you can mix legacy hardware platforms between DVI, USB, PS2, and Sun solutions?

**BUYING TIPS:**

# Data Center Furniture



**FURNITURE IS THE REAL BACKBONE** of your data center. But buying data center furniture isn't as simple as pointing and clicking.

✓ **Know Your Company & Employee Needs**

When looking to buy data center furniture, the best place to start is with your company and employee needs. "Some companies need conference room furniture for secure and private consultations and others, such as network centers, might utilize server cabinets or colocation cabinets and racks," says Susan Wynne, senior sourcing specialist at Rackmount Solutions (866/207-6631; [www.rackmoundsolutions.net](http://www.rackmoundsolutions.net)) The furniture you choose depends on the services your company provides.

After deciding what types of furniture you need, you should look for key features, such as height-adjustment for chairs or cable management systems for racks. If you can invest in modular furniture with swappable pieces, you'll have room for future growth, according to Wynne. And it's always important to choose furniture

that will have a long lifespan. "You have to know that your current furniture will still be available in six or 12 months should you wish to duplicate or expand," Wynne says.

✓ **Make Sure You Use Your Space Efficiently**

You can save money on data center furniture without sacrificing quality by simply making sure you are using space efficiently. One way to do this is to go vertical rather than horizontal, possibly by investing in pieces of furniture that are wall-mountable. "Office and lab space is at a premium," says Kristen Speranza-Diamond, vice president at Hergo (888/222-7270; [www.hergo.com](http://www.hergo.com)). "It's beneficial to go vertical and make the best use of square footage."

Speranza-Diamond says that most necessary pieces of furniture and equipment for data centers are becoming less expensive, including LCD displays, "so everyone is upgrading and making the transition to go compact." Manufacturers are putting more advanced technology into smaller packages, which will help

you put more equipment into each piece of furniture.

✓ **Check Vendor Longevity & Reputation**

A solid data center furniture vendor will be well-established and have a long history in the industry. If a vendor has a long track record of high-quality products and services, then you can view it as a partner and work with the company for years to come. "You want a vendor that you can invest in for the future," says Eli Hertz, CEO and president of Hergo. "You don't want to deal with a company that will only be around for a one-time purchase."

Also, when it comes to choosing the vendor, do your due diligence and research all of your available options. "Look for a reputable company with knowledgeable sales staff and one with short lead times," Wynne says. She also recommends spending more money upfront on quality products from a long-standing vendor. "The initial investment may be more than you wanted to spend, [but] the furniture will stand the test of time." □

## KEY TERMS

**Adjustable height.**

Refers to components users can raise or lower for a better individual fit. Some higher-end furniture can be adjusted electronically.

**Cable management.**

Built-in grommets, channels, or other features to manage cables and wiring.

**Modular.**

Furniture components that are interchangeable or can be easily modified.

## BUYERS' CHECKLIST

✓ **Seek out quality.** Although looking for deals can help companies on a tight budget, sacrificing quality as a result can end up costing companies more in the long term, especially if buying from vendors that don't offer lifetime warranties on furniture.

✓ **Know the delivery terms.** Before buying furniture, determine if the delivery includes bringing it inside the facility, requires a lift gate or loading dock, and includes assembly or puts the responsibility on you or a third-party installer.

✓ **Go modular when possible.** Buying components that are interchangeable lets you modify the setup to meet changing needs, including downsizing or expanding space. Increasingly, individual furniture units can be mixed and matched and layout configurations easily altered.

✓ **Build vertically.** Purchase components that support building vertically for better space efficiency.

**BUYING TIPS:**

# Cable Management Solutions



**MANAGING CABLES** is an afterthought. That's an unfortunate reality among many data centers, says Ken Koty, sales engineer at PDU Cables (866/631-4238; [www.pducables.com](http://www.pducables.com)). Among other things, not having a cable-management plan and guidelines makes troubleshooting problematic.

#### ✓ Know What's Available

Brett Femrite, sales manager at Rackmount Solutions (866/207-6631; [www.rackmoundsolutions.net](http://www.rackmoundsolutions.net)), says well-designed patch cable storage managers, which house and cover patch cords between patch panels and devices, are popular. He says they are not only functional in helping reduce cable sprawl, but they are also bend-radius-compliant and offer cosmetic appeal, as well. Other cable management options include horizontal and vertical wire managers (which can be mounted on the front or rear of your equipment rack or cabinet), cable ladders, a large assortment of cable trays and conduits, and various wire minders (rings) that can be mounted on any rack system.

Also very popular, Femrite says, are vertical and horizontal lacer bars. "These bars can be mounted on a rack or within a cabinet and have slots through which Velcro enclosures or cable wraps are routed to hold groups of cable," he says.

#### ✓ Plan For Expansion

Laura Viars, senior sourcing specialist at Rackmount Solutions, says if you intend to incorporate more equipment in the future, ensure your cable management configuration allows for it. Do this by making certain managers (both in-rack cable managers and external trays and ladders or conduits) don't meet or exceed their fill capacities. Most management options are available in multiple sizes, she says, ensuring a fit with plenty of excess if needed.

Also seek solutions with the flexibility to add new equipment or troubleshoot an existing component. "Lean toward reusable options such as Velcro straps in lieu of cable ties and managers that allow easy access to their contents," she says. Have an idea of when you're looking to expand and by how much. If you expect rapid and near-term growth, keep cables loosely organized during implementation by cutting down on the bundling and by using managers (D-rings vs. managers with covers) offering easier access.

#### ✓ Check Vendor Experience, Warranties & Other Factors

Because cable management systems affect a range of data center infrastructure subsystems, including airflow management and mechanical and electrical distribution, Lars Strong, senior engineer at Upsite Technologies (888/982-7800; [www.upsite.com](http://www.upsite.com)), says a vendor needs to have comprehensive knowledge of data center operations.

Vendors should have experience that matches your business size and type, warranty products and work, offer easy ordering, provide complete solutions and knowledge concerning network configurations, carry parts that fit into your existing

systems, and guarantee installation and network performance.

#### ✓ Consider Color & Labeling

Koty says when possible, use color coding to help visually identify cables quickly, simplify management, and save time when tracing cables. With data cables, use color to identify the cable's role/function or connection type. With power cables, use color to identify and organize dual-power feeds for redundant power sources.

Secure labels so they're accessible but difficult to remove. Also, maintain a spreadsheet that identifies the cables and colors, where cables come from and go, and configurations. □

## BUYERS' CHECKLIST

✓ **The basics.** Laura Viars, senior sourcing specialist at Rackmount Solutions (866/207-6631; [www.rackmoundsolutions.net](http://www.rackmoundsolutions.net)), says no matter the size of installation planned, you'll likely need basic management items such as vertical managers to bundle cable along the height of the racks/cabinets; horizontal managers to bring the cabling neatly from the drop to the equipment; and Velcro straps to bundle cables as needed.

✓ **Testing.** Pre-test all cable before installing, says Ken Koty, sales engineer at PDU Cables (866/631-4238; [www.pducables.com](http://www.pducables.com)). Once installed, it's more difficult to test and identify problems.

✓ **Think about heating and cooling.** Where heating and cooling efficiency are concerned, Koty says, using overhead racking for network and storage cables will prevent air dams forming under the floor. Also, be sure your cable management solution keeps cabling out of the way of exhaust fans in cabinets, he says.

## KEY TERMS

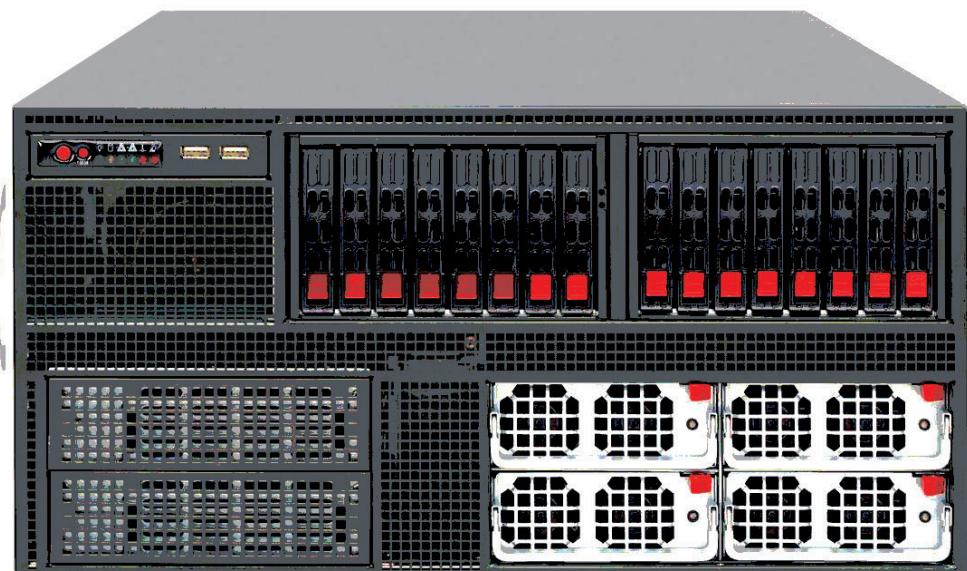
### Cable bend radius.

The minimum radius a cable can acceptably bend and still function as intended.

### TIA/EIA.

The TIA (Telecommunications Industry Association) and EIA (Electronic Industries Alliance) provide best practice guidelines regarding cabling infrastructure.

# BUYING TIPS: Servers



**BUYING A NEW SERVER** takes significant prep work. Beyond pinpointing the data center's needs and how the server will meet them, there are budgetary, compatibility, and vendor considerations to address, as well.

#### ✓ *Determine What's Important*

Charles King, president and principal analyst at Pund-IT, counts CPUs, memory, and I/O as the most critical server features, though their relative importance depends on the application and workload they'll support. Companies running a business-critical database or online transaction program, for example, should eye a higher-end CPU/system than what's needed for general-purpose applications. For virtualization-related use, spend more for extra memory and I/O.

Emre Kulali, director of channel marketing at Power Assure (888/225-1575; [www.powerassure.com](http://www.powerassure.com)), says that, in addition to the CPU, memory, and I/O, you need to consider form factor (how many U's, expandability, accessibility), the hard drive and interface, and manufacturer brand (what type of documentation, service, and warranty are available).

Kulali says you also need to know the server's power capabilities, including whether you can upgrade or add additional power supplies. "In order to maximize the transaction capacity of a data center, the size, power consumption, and compute capacity of servers need to match the facility. You want to maximize the transaction capacity, max out the available power, and ideally use all available space in the data center."

#### ✓ *Watch For Trends*

There are energy-efficient and highly scalable compute platforms available, Kulali says. Data center managers need to watch these trends carefully and determine the compute systems that would respond best to business needs as well as reduce energy costs and improve compute efficiency, he says.

"As data center managers are going through hardware refresh cycles with an eye on these new trends, they need to make informed decisions by requesting reference information and measurements as it relates to power consumption, efficiency, and performance of servers beyond vendor specifications," he says.

#### ✓ *Know The Impact Of Virtualization & Consolidation*

John Sloan, lead analyst for virtualization and consolidation at Info-Tech

Research Group, says that unlike the distributed processing world in which servers had a one-to-one relationship with applications, consolidation and virtualization are becoming the norm today.

In this space, Sloan says it's important to know how a new server will fit into a consolidated stack that includes servers, networks, and storage. Unlike distributed models, "in a consolidated infrastructure, the server is a unit of hard capacity (processing and memory) that's combined with networks and storage in a resource pool that's partitioned up into virtual entities." Increasingly, he says, enterprises aren't buying servers, but blocks of capacity. What differentiates current offerings "is how the interconnects are managed and how the whole thing is managed as one resource pool," he says. Typically, blade servers are the form factor for consolidated offerings, he says.

#### ✓ *Consider Your Budget*

Before you get started with a server upgrade or replacement, be sure to carefully plan your budget. Costs associated with a server upgrade can be staggering, says Charles Jansen, technical support manager at Aberdeen LLC ([www.aberdeeninc.com](http://www.aberdeeninc.com)). Possible expenditures include those related to equipment, software licensing, labor, telco and power company services, facility improvements, vendor support, and downtime. Additional costs related to supporting a new platform can include those for power, network cabling, cooling, rack space, and management personnel, he says.

Sloan says, "In any infrastructure purchase, the upfront capital acquisition cost is just part of the deal. Three- to five-year total costs should be calculated, including maintenance and facilities costs." □

## BUYERS' CHECKLIST

- ✓ Match the application and workload the server will support to the CPU, memory, I/O, storage, and other components they'll require.
- ✓ Recognize that virtualization, consolidation, and cloud computing are trending areas where servers are concerned.
- ✓ Ensure the vendor satisfies all questions concerning support, compatibility, performance, and other issues.

## KEY TERMS

### Configuration.

Refers to a server's makeup in terms of components (CPU, memory, storage, etc.), OS, and the like.

### TCO (total cost of ownership).

Includes the server's initial acquisition cost but also associated maintenance, facilities, cabling, and other expenses covering three to five years.

**BUYING TIPS:**

# Data Center Flooring & Accessories

**YOU MAY NOT ALWAYS THINK about the material you're walking on as you move through your data center, but remember that this flooring can be just as important as the servers and other equipment it holds. Choosing the right flooring provides a stable, efficiently cooled data center.**

**✓ Know The Weight**

Raised floor tiles come in different weight capacities, so you'll need to consider your weight-bearing requirements when selecting floor tiles, says Ken Koty, sales

engineer at PDU Cables (866/631-4238; [www.pducables.com](http://www.pducables.com)). The final floor has to be strong enough to support your equipment at the height of the raised floor. Also be aware of raised floor rolling load and be sure to use heavy-duty floor tiles for the areas you will be moving equipment in and out of the data center.

It's important to put some thought into long-term requirements, too. As rack sizes grow and densities increase, at some point your floor tiles may need to support a greater weight than you have today. Plan

ahead and install floor tiles to meet both current and future needs, Koty says.

**✓ Check The Finish & Material**

Be careful when selecting the finish of your floor, Koty says. "Some finishes don't last, and you don't want be constantly replacing tiles in high-traffic areas to keep the floor looking uniform."

Floor tiles are made of different types of materials. Avoid those wrapped in galvanized metal, Koty says, as the galvanized-wrapped tiles could cause zinc whiskers over time. And, if you are using cement-filled tiles, be sure to use a sealant to coat any cut edges of your tiles.

**✓ Be Aware Of Cooling & Height**

One of the most crucial functions of data center flooring is to aid in cooling. Fans and other rack-based cooling solutions are essential, but if you can maximize the available space underneath the floor, you can increase your data center's overall cooling efficiency. Also, Koty says, you if want your new flooring to accommodate a hot/cold aisle configuration, make sure to plan your under floor cable layout according to CRAC and PDU/RPP unit locations.

**✓ Plan For Cutouts**

Flooring cutouts are necessary to allow cables to run above and below the floor. But these cutouts can negatively impact the floor's cooling efficiency and aesthetic appeal. You'll want to install grommets with filler material that will plug the holes.

Plan ahead and install brushed floor grommets as the floor tiles are being installed, Koty says. If you wait to install the grommets after the equipment is installed, you have fewer grommet options and there is the risk of introducing contaminants, he says.

**✓ Check Vendor Experience**

If your company doesn't have anyone on staff with experience in data center flooring, don't hesitate to rely on the expertise of a vendor. It can help you choose the right flooring and prevent the need for a potentially costly flooring replacement down the road.

Working with experienced flooring contractors can save you time and money, Koty says. They should be better able to tell you how long the job will take and deliver on their targeted completion date, he says. **P**

## BUYERS' CHECKLIST

- ✓ Do the flooring panels fit your needs and allow for effective cable management?
- ✓ Is there enough open space underneath the floor for cable routing and cooling?
- ✓ Does your vendor have a stellar reputation and testimonials from past clients?
- ✓ Are all sections of the data center flooring capable of handling the weight and traffic to which they will be subjected?

## KEY TERMS

**Bypass airflow.**

Conditioned air that does not reach computer equipment. Unintended bypass airflow can occur by escaping through cable cut-outs, holes under cabinets, misplaced perforated tiles, or holes in perimeter walls.

**Directional airflow.**

Airflow panels such as perfs and grates that deliver air directly to the face of the rack.

**Panel.**

The material that makes up the walking surface of a raised floor. Depending on your weight and traffic needs, the panel may be made from steel, concrete with steel reinforcing bars, or aluminum. The interior may be filled with a lightweight material to give you the ability to easily move panels.

**Raised floor.**

A system of pedestals, stringers, and floor tiles that create an elevated floor environment. The under floor of a raised floor is accessible and can be used as a distribution path for air conditioning, HVAC piping, data cables, and branch circuit power cables.

## BUYING TIPS:

# Used & Refurbished Equipment

### ✓ Establish A Plan For Outdated Equipment

From an IT perspective, dealing with outdated equipment should be part of an overall disposition plan you do within a hardware asset-management program, says Darin Stahl, lead research analyst at Info-Tech Research Group. Dealing with outdated equipment should "just be an outcome of your end-to-end hardware asset-management program, and just one of the disposition options. Plug it into the backend of that process and don't make it a one-time event or fire sale or yard sale every spring," he says.

### ✓ Put Your Old Equipment Back In The Market

When seeking a company that will help with your asset disposal, "Look to work with companies with a reputable asset recovery or refurbishing program," says Brett Femrite, director of business development for Rackmount Solutions (866/207-6631; [www.rackmoundsolutions.net](http://www.rackmoundsolutions.net)). "They can often provide help in determining the value and final disposition of your unused IT assets and offer a variety of options to suit your needs."

For example, a disposal service company may be able to tell you if it'd make more economic sense to repair or reconfigure a given product, rather than destroy it or tear it apart for recycling. By maximizing the value of your equipment, an asset recovery service can also help to improve the green status of the company, because you are helping to make hardware sustainable for a longer period of time.

### ✓ Used & Refurbished Are Not The Same

Properly refurbishing equipment requires a number of steps, says Benjamin Yampolsky, director of technology at Aventis ([www.aventissystems.com](http://www.aventissystems.com)). "Many companies that sell off-lease, used, or excess inventory gear are not familiar with the refurbishing process," he says. "The label 'refurbished' is not synonymous with 'used.' 'Refurbished' means that the item has been restored to factory settings, with no trace of the previous user's data. This includes doing a secure erase on all hard and flash drives, wiping the configuration in the various low-level firmware of the product, as well as doing extensive

testing to confirm the product is operational per original factory standards."

### ✓ Know Your Warranty & Return Policies

Purchasing refurbished data center equipment doesn't always work out the way you planned. Whether it's an item that's dead out of the box or a component that arrived damaged, you want to know that any problems will be handled quickly. Knowing how a supplier handles equipment returns is an important factor in any purchase decision.

Warranties are only as good as the company offering them, so do your homework. Reputable companies provide faster turnaround on advance replacement exchanges, they may waive restocking fees, and they offer better support options.

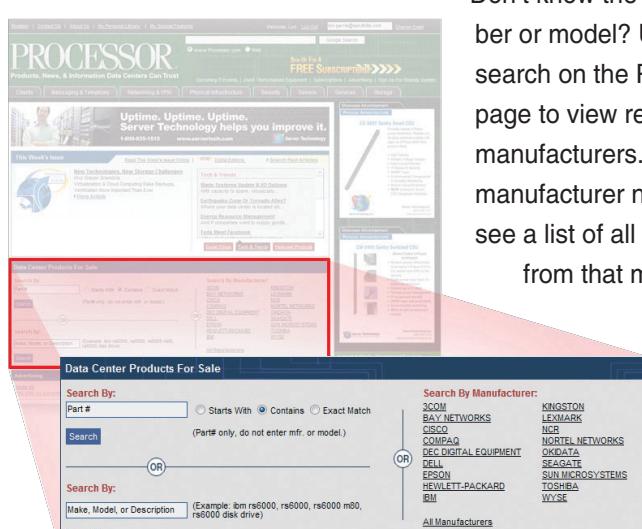
And remember, even if a supplier accepts your returned equipment, you might not get your money back and instead will get a return for credit. If your equipment purchases are infrequent, your money could be tied up until you find something else you need to buy.

## USE PROCESSOR.COM TO FIND DATA CENTER EQUIPMENT

Looking for help pinpointing the products you need, from vendors you can trust? Finding the equipment you need is easy with Processor's online Data Center Products For Sale Database.

From Processor's home page ([www.processor.com](http://www.processor.com)), you can search for a specific part number, make, model, or description. Enter the information in the appropriate box and click Search. You'll see a list of available equipment. If you don't see the particular piece you're looking for, scroll to the bottom of the search results page to conduct a more detailed search. There, you can search by part number, model, price, location, and more.

Don't know the specific part number or model? Use the drill-down search on the Processor home page to view results from specific manufacturers. Simply click the manufacturer name, and you'll see a list of all equipment listings from that manufacturer.



**Do you have excess equipment?  
Post it for sale on Processor.com!**

**On the Processor.com home page,  
click Used/Refurbished Equipment.**



### Used/New/Refurbished Equipment

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**Follow the on-screen directions from there!**



## BUYING TIPS:

# Data Center Cooling

**FOR DATA CENTER PROFESSIONALS**, cooling is as vital a concern as storage capacity and security: Data centers run more efficiently and reliably with the proper temperature, and uptime is everything. Having the right cooling equipment is essential.

#### ✓ Know How Much Power It Takes

Before you make changes to your existing cooling equipment or purchase new equipment, you should first measure how much power is being used to cool your data center and whether this is efficient enough to adequately cool the room. You should get a baseline measurement of the temperature inside of the data center and then move on to the equipment housed inside racks and cabinets.

There are many ways to do this, but Jim Magallanes, engineering director at Computer Room Uptime (877/908-8043; [www.cruptime.com](http://www.cruptime.com)), recommends installing an energy monitor to determine the exact amount of energy the data center is using.

#### ✓ Decide Between Open Or Closed Loop

One major consideration is whether to select an open- or closed-loop system. Open-loop cooling systems utilize a liquid coolant such as water that is exposed to air and the environment. They tend to have a lower initial cost but also require more frequent maintenance and water treatment, and they suffer from reduced efficiency compared to closed-loop systems. A closed-loop system uses an air- and environment-isolated liquid coolant. Closed-loop systems tend to have a higher initial cost but require less maintenance and provide better cooling efficiency.

#### ✓ Consider Where The Equipment Will Be Used

Eddie Stevenson, marketing manager at MovinCool (800/264-9573; [www.movincool.com](http://www.movincool.com)), says it's important to consider where the cooling equipment will be operated. Analyze the server room and take into account all factors that could potentially change your cooling needs, such as "the number of watts being outputted, if it's facing a window, and any factors that could escalate the heat in that room."

#### ✓ Look For Dependable Units

"You want to look at the quality of the manufacturer and choose a product from a manufacturer that has been around for a long time," Stevenson says. "Are they housing fan motors correctly? Are they welding the casters? With portable units, they get moved

around a lot, so make sure they will stand up moving from location to location over time."

#### ✓ Ensure The Unit Can Keep Up With Demand

Make sure the unit you purchase is designed for 24/7 cooling and can maintain the temperature you require, says Mike Paulson, president of AmeriCool (800/680-0725; [www.americoolinc.com](http://www.americoolinc.com)). Particularly with portable air conditioners, he says, a common mistake is purchasing a unit that is not designed for commercial applications and environments. "With most data center managers wanting their rooms kept at 68

degrees, it is important to find a unit that will cool below 68 degrees and run 24/7," he says.

#### ✓ Don't Forget Airflow Management

"A great deal of money is thrown away on cold air that just doesn't reach the equipment," says Laura Viars, senior sourcing specialist at Rackmount Solutions (866/207-6631; [www.rackmoundsolutions.net](http://www.rackmoundsolutions.net)). If you can add filler panels and other add-ons to your cabinets and racks, then you can direct cool air to where it's needed. This is a relatively inexpensive solution to cooling issues, and it could result in long-term savings. **P**

## BUYERS' CHECKLIST

- ✓ How many BTUs do you need to keep your equipment at the appropriate temperature?
- ✓ Do you need a closed- or open-loop system?
- ✓ Where will the cooling equipment be located?
- ✓ How much of a concern is noise output?

## KEY TERMS

### BTU (British Thermal Units).

Used to measure the amount of energy required to heat a liquid such as water. A single BTU represents enough energy to raise the temperature of one pound of water by one degree Fahrenheit at a constant pressure of one atmosphere. In the context of cooling equipment, BTUs are listed as a given rating per hour.

### Closed loop, open loop.

A closed loop cooling system utilizes a liquid coolant that is isolated from air and the environment; an open loop system utilizes a liquid coolant that is exposed to air and the environment.

### PUE (power usage effectiveness).

A technique used to help enterprises measure how much of their total data center energy usage is going toward IT and computing equipment.

# BUYING TIPS: PDUs



**PDUs HAVE EVOLVED** into integral components of a modern power distribution infrastructure, delivering correct voltage and current to multiple outlets. Here are some things to watch for when purchasing your next PDU.

## ✓ Understand The PDU Options

"There are generally three types of PDUs: basic, metered, and switched," says Brett Femrite, director of business development at Rackmount Solutions (866/207-6631; [www.rackmoundsolutions.net](http://www.rackmoundsolutions.net)). A basic PDU lacks monitoring and remote administration capabilities. A metered PDU has everything a basic PDU has, but adds a meter that lets users visually track amperage and management software that lets users monitor the aggregate current being drawn on each PDU. Switched PDUs support everything on a metered PDU and add local and remote control capabilities on a per-outlet level. Redundancy is also important, Femrite says. A dual-circuit PDU offers added fault tolerance with two power inputs.

Jim Fink, consultant at Upsite (888/982-7800; [www.upsite.com](http://www.upsite.com)), says a feature-rich PDU can let you know when load on any branch circuit exceeds threshold values that you define or when a breaker trips. Monitoring can also include power quality information and transformer temperature alarms.

## ✓ Know The Power Available

One mistake PDU buyers make is not specifying the power available at the rack. "If you know what power is available at the rack, you are well on your way to correctly specifying the rack PDU," says Greg More, product marketing manager for the PDU business at Raritan (800/724-8090; [www.raritan.com](http://www.raritan.com)).

The power available at the rack is largely defined by the outlets on the whips, More says. For example, if the outlets on the whips are NEMA L15-30R (L = locking, 15 = three-phase 208V Delta, R = receptacle), then the PDU will support 208V outlets on the PDU. If the outlets on the whips are NEMA L21-30R (21 = three phase 208V Wye), then the PDU can support both 120V and 208V outlets.

## ✓ Determine The Power Required

The National Electrical Code requires circuits be loaded to no more than 80% of the circuit breaker protecting that circuit, More says. Most racks have redundant power, meaning two PDUs per rack, but make sure you split the load. Using a NEMA L6-30R (208V) whip example, More says, this circuit would be protected by a 30A circuit breaker at the remote power panel, which would trip at about 30A. To meet the 80% requirement, the

PDU could only be loaded to 24A. The total load could be a maximum of 5kW (24A x 208V). In the case of redundant PDUs, More says, split the load in half (2.5kW per PDU) so that if one power feed fails, the remaining PDU will be able to handle the total load and remain at or under the 80% requirement.

## ✓ Account For Growth

Make sure the PDU can handle your needs both now and into the future. "If you don't precisely match up the PDU with your power

consumption needs, taking into account anticipated growth/increases, you can wind up having a breaker tripped," Femrite says.

But, Fink says, be careful not to oversize the PDU. "Consider serving new growth zones in the data center with new PDUs when the time comes rather than from grossly oversized PDUs purchased now." Also, if you need to add branch circuits to existing PDUs without a shutdown, some PDUs allow safe addition of branch circuits while the PDU remains energized, he says. □

## BUYERS' CHECKLIST

The following tips were provided by Julie Brown, marketing manager at Server Technology (800/835-1515; [www.servertech.com](http://www.servertech.com)).

- ✓ **Know the different types of PDUs.** What type of PDU do you need for your data center? Choose from basic, intelligent, metered, or switched.
- ✓ **Know your power needs, or consult an expert.** Make sure you're buying the right PDU for the job. You want to make sure that the PDU you buy matches up with your power consumption needs. If you don't know what your needs are, bring in an expert who can help you determine them.
- ✓ **Look for the best quality.** You want the best quality you can afford for reliability and performance to power your mission-critical equipment.
- ✓ **Service.** Make sure you can get tech support and services after the sale.

## KEY TERMS

### Intelligent PDU.

Any PDU that offers Web-based management, meter power at both the PDU and individual outlet level, and real-time power monitoring.

### K Rating.

For PDUs with transformers, this is the transformer's ability to handle harmonics.

### Poles.

The number of spaces in a panel that breakers can occupy; 42 poles is common.

### Three-phase wye.

This system has a neutral wire that allows the three-phase system to provide a higher voltage (line-to-line, e.g. 208V) while still supporting lower-voltage single-phase (line-to-neutral, e.g. 120V) appliances.

# PROCESSOR

# Network With Your Peers

## At These IT Training & Association Meetings Across The United States

### OCTOBER

#### AITP Pittsburgh

Oct. 8, 5 to 8 p.m.

Silvioni's Restaurant

2125 Babcock Blvd.

Pittsburgh, Pa.

[www.aitp-pgh.org](http://www.aitp-pgh.org)

#### AITP Northeastern Wisconsin

Oct. 10

Radisson Hotel and Convention Center

2040 Airport Drive

Green Bay, Wis.

[new.aitp.org](http://new.aitp.org)

#### AITP National Annual Meeting of the Members and Region 5 Fall Technology Conference

Oct. 10-11

Radisson Hotel and Convention Center

(adjacent to the Oneida Casino)

2040 Airport Drive

Green Bay, Wis.

[www.aitp.org/region5](http://www.aitp.org/region5)

#### AITP Washington, D.C.

Oct. 11

Alfio's La Trattorio Restaurant

4515 Willard Ave.

Chevy Chase, Md.

[www.aitpdc.org](http://www.aitpdc.org)

#### Containment Systems & Benchmarking Data Center Infrastructure (AFCOM Omaha)

Oct. 11

8 to 11 a.m.

Bass Pro Shop

2901 Bass Pro Drive

Council Bluffs, Iowa

[www.afcomomaha.org](http://www.afcomomaha.org)

#### AITP Cornhusker

Oct. 18, 5:30 to 7 p.m.

Southeast Community College

8800 O St., Room U106

Lincoln, Neb.

[www.aitpcornhusker.org](http://www.aitpcornhusker.org)

#### AITP San Diego's 4th Annual Cloud Computing Conference

Oct. 18, 8 a.m. to 4:30 p.m.

San Diego Del Mar Hilton

15575 Jimmy Durante Blvd.

Del Mar, Calif.

[www.sdcloudcomputing.com](http://www.sdcloudcomputing.com)

#### ISSA Baltimore

Oct. 24

Concurrent Technologies Corp.

8530 Corridor Road

Savage, Md.

[www.issa-balt.org](http://www.issa-balt.org)

#### WPDevCon

Oct. 24

San Francisco, Calif.

[www.wpdevcon.net](http://www.wpdevcon.net)

#### AITP Akron

Oct. 30

Akron, Ohio

[www.akron-aitp.org](http://www.akron-aitp.org)

### NOVEMBER

#### AITP Washington, D.C.

Nov. 8

Alfio's La Trattorio Restaurant

4515 Willard Ave.

Chevy Chase, Md.

[www.aitpdc.org](http://www.aitpdc.org)

#### San Diego Technology Symposium

Nov. 8

5775 Kearny Villa Road

San Diego, Calif.

[www.scalematrix.com/sdtech](http://www.scalematrix.com/sdtech)

#### AITP Pittsburgh

Nov. 12, 5 to 8 p.m.

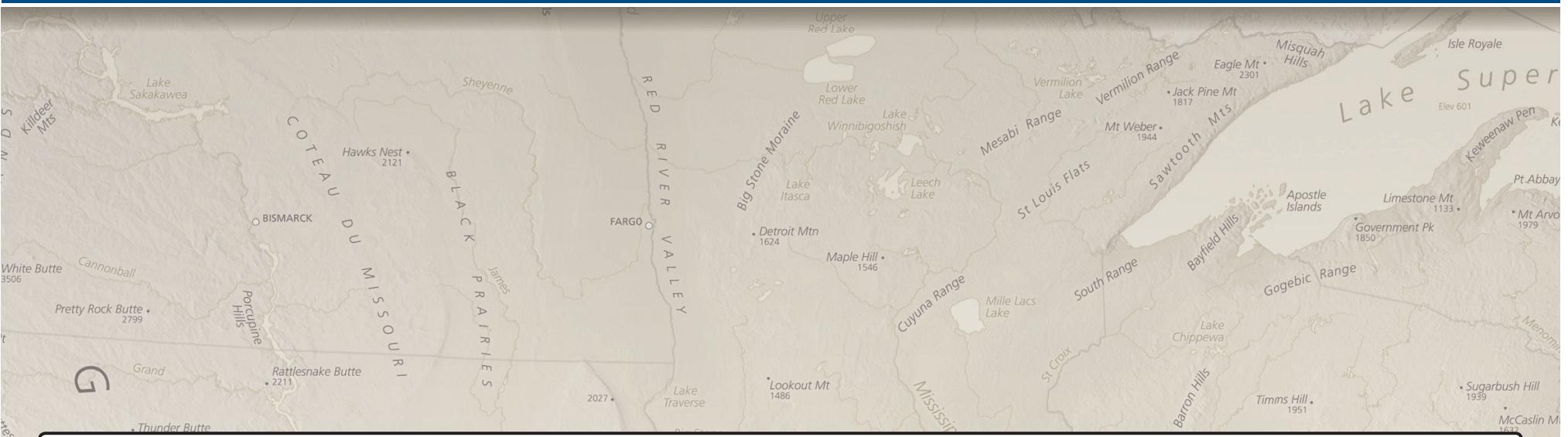
Silvioni's Restaurant

2125 Babcock Blvd.

Pittsburgh, Pa.

[www.aitp-pgh.org](http://www.aitp-pgh.org)

## Upcoming IT Events



### **AITP Northeastern Wisconsin**

Nov. 14

Holiday Inn-Appleton  
150 S. Nicolet Road  
Appleton, Wis.  
[new.aitp.org](http://new.aitp.org)

### **AITP Cornhusker**

Nov. 15

5:30 p.m.  
Lincoln, Neb.  
[www.aitpcornhusker.org](http://www.aitpcornhusker.org)

### **ISSA Baltimore**

Nov. 28

Concurrent Technologies Corp.  
8530 Corridor Road  
Savage, Md.  
[www.issa-balt.org](http://www.issa-balt.org)

## **DECEMBER**

### **Android DevCon IV**

Dec. 7

San Francisco, Calif.  
[www.andevcon.com](http://www.andevcon.com)

### **AITP Pittsburgh**

Dec. 10

5 to 8 p.m.  
Silvioni's Restaurant  
2125 Babcock Blvd., Pittsburgh, Pa.  
[www.aitp-pgh.org](http://www.aitp-pgh.org)

### **AITP Washington, D.C.**

Dec. 13

Alfio's La Trattorio Restaurant  
4515 Willard Ave.  
Chevy Chase, Md.  
[www.aitpdc.org](http://www.aitpdc.org)

### **ISSA Baltimore**

Dec. 19

Concurrent Technologies Corp.  
8530 Corridor Road  
Savage, Md.  
[www.issa-balt.org](http://www.issa-balt.org)

### **AITP Cornhusker**

Dec. 20

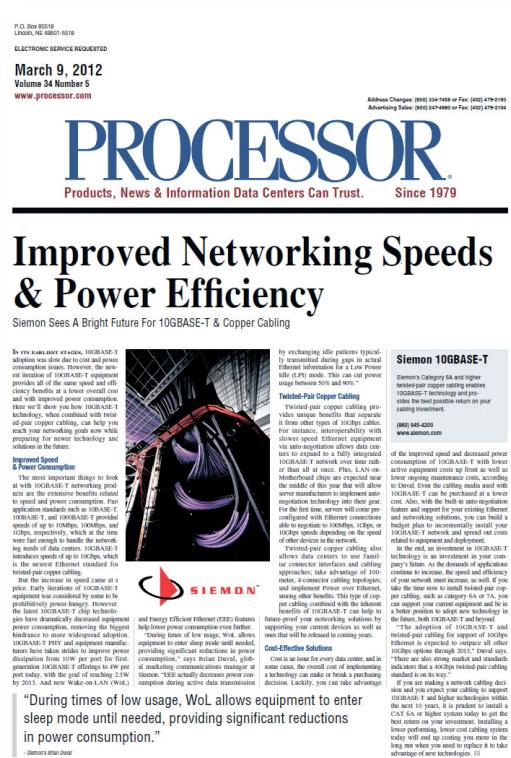
5:30 p.m.  
Lincoln, Neb.  
[www.aitpcornhusker.org](http://www.aitpcornhusker.org)

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[feedback@  
processor.com.](mailto:feedback@processor.com)**



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Here are brief snapshots of several companies offering products designed for the data center and IT industry. Listings are sorted by category, making it easy for you to find and compare companies offering the products and services you need.

You can find more detailed information on these companies and the products they offer inside this issue.

**To list your company and products, call (800) 247-4880.**

## Processor.com

### PHYSICAL INFRASTRUCTURE

## temperature @ lert

Temperature@lert is a leading provider of low-cost, high-performance temperature monitoring products designed to provide early warning of temperature changes before it's too late. The company's goal is to deliver products that can eliminate your worries about system malfunctions or product damage due to temperatures. The Boston, Mass.-based company has sold more than 10,000 products to customers in 40 countries.

#### Products Sold:

A full line of temperature monitoring products, including the Temperature@lert USB Edition, WiFi Edition, and Cellular Edition

(866) 524-3540 | [www.temperaturealert.com](http://www.temperaturealert.com)

### PHYSICAL INFRASTRUCTURE



A Division of Mestek Inc.

4830 Transport Drive | Dallas TX 75247

The Mestex division of Mestek is comprised of seven company brand names: Applied Air, LJ Wing, Aztec, Alton, Temprite, Koldwave, and Sierra. Mestek is involved in emerging technology and product research focused on using energy and water more efficiently, including ways to improve data center efficiency by using outside air, evaporative cooling, and optimized DDC control schemes.

#### Products Sold:

- Mechanical and evaporative cooling products
- Heating products
- Outside air tempering products
- Packaged evaporative cooling solutions for mission-critical applications

(214) 819-5262 | [www.mestek.com](http://www.mestek.com)

### PHYSICAL INFRASTRUCTURE



Based in New York City, Hergo Ergonomic Support Systems is an independent designer and manufacturer of enclosure cabinet solutions, technical computer furniture, and modular racking systems. The company's products are designed to promote organization in the workspace and to increase the productivity of computers, peripherals, and communications equipment. Hergo is known for its high-quality products and superior customer service.

#### Products Sold:

- Racks
- Enclosures/cabinets
- Motorized workstations
- Flat-panel arms
- Computer desks
- Cable management
- Power management

(888) 222-7270 | [www.hergo.com](http://www.hergo.com)

### PHYSICAL INFRASTRUCTURE



Upsite, the "Pioneering Company in Airflow Management Solutions" was founded by Ken Brill, who established the Uptime Institute, a think tank dedicated to identifying efficiencies within data centers. Upsite's LOK Family of energy-efficient solutions are engineered to optimize the data center. This sets Upsite apart. Upsite solutions empower data center managers to leverage cost savings for data center optimization (i.e. releasing stranded capacity, increasing server density, improving system reliability & reducing energy consumption).

#### Products Sold:

- KoldLok
- HotLok
- AisleLok
- EnergyLok

(505) 798-0200 or (888) 982-7800 | [www.upsite.com](http://www.upsite.com)

### SERVERS



Supermicro® (NASDAQ: SMCI), the leading innovator in high-performance, high-efficiency server technology, is a premier provider of advanced server Building Block Solutions® for enterprise IT, data center, cloud computing, HPC, and embedded systems worldwide. Supermicro is committed to protecting the environment through its "We Keep IT Green®" initiative by providing customers with the most energy-efficient, environmentally-friendly solutions available on the market.

#### Products Sold:

- Servers
- Network switches
- Motherboards
- Chassis
- GPU servers
- Storage solutions
- Embedded
- Blade servers

(408) 503-8000 | [www.supermicro.com](http://www.supermicro.com)

### PHYSICAL INFRASTRUCTURE



Rackmount Solutions' mission is to listen to the IT engineer's specific needs and deliver superb-quality, high-performance products through continuous product innovation and operational excellence. We pride ourselves in providing quality customer service, products that fit your IT requirements, and solid value for your money.

#### Products Sold:

- Wallmount and server racks and cabinets, including sound proof, air conditioned, and large cable bundle
- Desktop/tabletop portable racks
- Shockmount shipping cases
- Bulk cable

(866) 207-6631 | [www.rackmoundsolutions.net](http://www.rackmoundsolutions.net)

### PHYSICAL INFRASTRUCTURE



Sensaphone has been designing and manufacturing remote monitoring systems for more than 25 years and has more than 300,000 of its products in use. Sensaphone's product lineup offers a full range of devices with a broad number of features and applications designed to monitor your entire infrastructure and alert you to changes. All product engineering functions, including hardware and software design and circuit board layout and assembly, are performed at the Sensaphone facility in Aston, Penn.

#### Products Sold:

Remote monitoring solutions that provide email and voice alarm notification for problems related to temperature, humidity, water detection, power failure, and more.

(877) 373-2700 | [www.sensaphone.com](http://www.sensaphone.com)

### PHYSICAL INFRASTRUCTURE



Crenlo offers a broad range of standard enclosure and console product lines under their Emcor brand, each of which can be configured or modified by Crenlo to meet the specific requirements of most customers. Crenlo also offers completely custom enclosure solutions to meet the specific requirements of any application. Crenlo has more than 60 years of experience providing enclosure solutions to meet the needs of their diverse customer base.

#### Products Sold:

- Rackmount and wallmount enclosures
- Transit cases
- Rackmount accessories
- Monitoring and command and control consoles
- Custom enclosures ranging from kiosks to inverter enclosures

(507) 287-3535 | [www.crenlo.com/enclosures](http://www.crenlo.com/enclosures)

### PHYSICAL INFRASTRUCTURE



AVTECH Software, founded in 1988, is focused on making the monitoring and management of systems, servers, networks, and data center environments easier. AVTECH provides powerful, easy-to-use software and hardware that saves organizations time and money while improving operational efficiency and preparedness. AVTECH products use advanced alerting technologies to communicate critical status information and can perform automatic corrective actions.

#### Products Sold:

A full range of products that monitor the IT and facilities environment, including temperature, humidity, power, flood, room entry, and UPS

### PHYSICAL INFRASTRUCTURE



Founded in 1985, Raritan has become a leading provider of power and energy management, DCIM and KVM solutions. Our products are in use at more than 50,000 locations worldwide, including eBay, Cisco, Intel, NASA, and the United States Post Office, giving IT departments the tools they need to increase power management efficiency, better manage data center changes, improve data center productivity and enhance branch office operations.

#### Products Sold:

- Intelligent Rack Power Distribution Units
- Energy Management Software
- Data Center Infrastructure Management
- KVM and Remote Access Management

(732) 764-8886 | [www.raritan.com](http://www.raritan.com)

(888) 220-6700 | [www.AVTECH.com](http://www.AVTECH.com)



LANSTAR is a worldwide supplier and manufacturer of durable and innovative Technical furniture. All LANSTAR systems are expertly engineered to be interchangeable providing unparalleled flexibility and value. Our Professional staff, with a consultative sales approach, has been designing and providing solutions that are space effective and increase efficiency in the network environment. Let LANSTAR customize your system to fit virtually any need.

#### Products Sold:

- Computer cabinets
- Rackmount cabinets
- LAN racks
- KVM switching
- USB port blockers
- Raised flooring
- PDU's
- AV switches

(800) 474-3947 | [www.lanstar.com](http://www.lanstar.com)

**PHYSICAL INFRASTRUCTURE**

**LINDY®**  
CONNECTION PERFECTION

LINDY USA specializes in cables, adapters, electronics and accessories for computer, networking and audio video applications. Since 1932 Lindy has supplied high quality interconnects to customers in commercial, telecom and residential markets. What sets us apart is our complete dedication to innovation, performance and reliability. Our cabling products are truly outstanding.

**Products Sold:**

- Networking Products • Audio / Video • KVM • Sharing, Converting, Extending • USB and FireWire • Input Devices • Add-On Cards • Hardware and Security • Power • Cableless • Adapters and much more!

(888)-865-4639 | [www.lindy-usa.com/](http://www.lindy-usa.com/)

**Processor.com**

**PHYSICAL INFRASTRUCTURE**

**MAINLINE COMPUTER PRODUCTS®**

Mainline Computer Products has been in business since 1986 and has one of the nation's largest selections of LAN furniture, command centers, and server cabinets. We can serve companies of all sizes, including educational institutions and city, state, and federal government agencies. In addition to offering data center equipment, we can assist in the planning, design, construction, and design/build process.

**Products Sold:**

• Command consoles	• UPS and PDU systems
• Server cabinets	• Access flooring
• Computer room equipment	• Technical furniture

(800) 686-5312 | [www.mainlinecomputer.com](http://www.mainlinecomputer.com)

**PHYSICAL INFRASTRUCTURE**

**LOGICALIS**  
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Logicalis is an international IT solutions and managed services provider with a breadth of knowledge and expertise in:

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- Data center services
- Cloud services
- Managed services

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(866) 456-4422 | [www.us.logicalis.com/hphe](http://www.us.logicalis.com/hphe)

**PHYSICAL INFRASTRUCTURE**

**Rack Solutions®**

RackSolutions has been serving the data center market for more than 10 years. All of our products are designed, engineered, built, and shipped under our own roof. We have product solutions available for every major OEM, but if one of our existing products doesn't fit your needs, our top-notch mechanical and electrical engineers can create the item you need from scratch, solving even the toughest installation design challenges. Best of all, we typically don't charge up-front fees for design services.

**Products Sold:**

Computer server racks, cabinets, shelves, and mounting products.

(888) 903-7225 | [www.racksolutions.com](http://www.racksolutions.com)

**PHYSICAL INFRASTRUCTURE**

**STACO ENERGY® PRODUCTS CO.**

Staco Energy was founded in 1937 and is one of the longest-lasting innovators of power products and services in the world. Our recent innovations have created the foundation for entry into the SMB data center marketplace through pioneered design and expertise. We are committed to providing you with the best tailored power solutions for your needs.

**Products Sold:**

A full line of UPS products, including our new FirstLine P 65 – 250kVA UPS, FirstLine PL 10 – 100kVA UPS, FirstLine BMS, and related accessories and services.

(866) 261-1191 | [www.stacoenergy.com](http://www.stacoenergy.com)

**PHYSICAL INFRASTRUCTURE**

**AUSTIN HUGHES**

Founded in 1995, Austin Hughes Electronics Ltd is a design and manufacturing group that offers a broad range of solutions based around 19 inch rack mount technology. With a wealth of experience Austin Hughes design and development teams are focused to rapidly transform customer requirements and market trends into saleable solutions.

**Products Sold:**

- Infra solution Cabinet Smartcard Handels
- InfraPower Cabinet Intelligent PDUs
- CyberView Rackmount KVM & LCD Console Drawer
- Environmental Sensors

(510) 794-2888 | [www.Austin-Hughes.com](http://www.Austin-Hughes.com)

**PHYSICAL INFRASTRUCTURE**

**METHODE®**

CTI was founded by Methode Electronics in 1997 and during the past 13 years has provided data centers with innovative solutions. CTI has recently become the cornerstone of Methode's Data Solutions Group, joining forces with the Methode dataMate and OPTOKON divisions in supporting the data center and communication industries. In addition, our highly qualified professional services team can engineer and install the best solution to fit your needs.

**Products Sold:**

Fiber and copper cabling solutions; Smart DACs; cabinets, patch panels; asset tracking; biometric access control; optical test equipment; harsh environment network equipment

(888) 446-9175 | [www.methode.com/data](http://www.methode.com/data)

**PHYSICAL INFRASTRUCTURE**

**PDUs direct**

PDUsDirect.com is a Master Distributor of select Server Technology PDUs for server and networked environments. PDUs Direct's basic, metered, and switched Rack PDUs provide local and remote power management, power monitoring, and environmental monitoring. We pride ourselves in offering industrial-grade quality products at the lowest prices, with the fastest shipping (most orders shipped within 24 hours) and simplest purchase process. We are the Power Behind the Business.

**Products Sold:**

A complete line of metered and basic PDUs, and 20A switched PDUs.

(888) 751-7387 | [pdusdirect.com](http://pdusdirect.com)

**PHYSICAL INFRASTRUCTURE**

**BayTech®**

BayTech was founded in 1976 and, since the 1990s, has developed unique products for remote power management. The company uses printed circuit board instead of wires for a better, more resilient connection between the data center equipment and the receptacle. BayTech provides an extensive Web site with brochure downloads, warranty information, and reseller support and also offers evaluation units for data centers.

**Products Sold:**

- Power control, distribution, management, and metering
- Power transfer switches
- Console management and remote site management

(800) 523-2702 | [www.baytech.net](http://www.baytech.net)

**PHYSICAL INFRASTRUCTURE**

**HM CRAGG**  
Quality People. Quality Power.

An integrator and master distributor providing quality power solutions, HM Cragg has built a reputation as the company that delivers innovation to aid and satisfy its customers. HM Cragg was founded in 1968 and is 100% employee-owned, focusing on quality people and exceptional products.

**Products Sold:**

- AC and DC power solutions (UPSes, power distribution)
- Control and monitoring (environmental and power)
- Connectors and cables (cord sets, ePDU cables)
- Cooling (air flow management, portable cooling)
- Racks and enclosures (standard racks, battery racks)
- Safety equipment (spill containment, safety signs)

(800) 672-7244 | [www.hmcragg.com](http://www.hmcragg.com)

**PHYSICAL INFRASTRUCTURE**

**POWER ASSURE**

Power Assure helps enterprises, government agencies, and managed service providers gain the insight, knowledge, and automated control necessary to improve data center capacity, service levels, and power usage. The company counts ABB, Dell, IBM, Raritan, and VMware as partners.

**Products Sold:**

Dynamic Power Management & Optimization software that replaces "always-on" data center operations with a more efficient "on-demand" model aimed at cutting power consumption by 50 to 60%.

(408) 980-1900 | [www.powerassure.com](http://www.powerassure.com)

**NETWORKING & VPN**

**METRIC SYSTEMS CORPORATION**

Metric Systems Corporation® designs and manufactures broadband wireless networking equipment, and end-to-end solutions for government and industry. We've been in the business of manufacturing and integrating reliable industrial-grade wireless networking systems for over 25 years. Our networks are deployed around the world protecting and supporting people and machines. Our specialty is working with your unique requirements and existing infrastructure to provide a networking solution that fits your requirements, schedule, and budget.

**Products Sold:**

Rhino Box® Environmentally Controlled Equipment Shelters and SAFARI™ Wireless Controllers and Radio Systems.

(800) 549-7421 | [www.metricsystems.com](http://www.metricsystems.com)

## NETWORKING &amp; VPN



Alvaco Networks specializes in load balancing technology. Our expertise allows us to meet the needs of any network, from basic to highly sophisticated. We have a proven track record for resolving network and balancing applications for small, medium, and large size companies.

**Products Sold:**

- Load Balancer Systems
- VPN Aggregators
- Cell Technology
- Access Routers
- Firewall/Broadband

(407) 574-2017 | [www.alvaco.com](http://www.alvaco.com)

## CLIENTS



The Smart Choice for Text Retrieval® since 1991, dtSearch® offers over 21 years of experience in parsing and searching data. The dtSearch product line includes enterprise and developer text search products, meeting some of the largest-capacity text retrieval needs in the world. dtSearch's website offers hundreds of developer case studies and press reviews. The company has distributors worldwide, including coverage in six continents.

**Products Licensed:**

Text retrieval products, including:

- Desktop with Spider
- Network with Spider
- Publish (for portable media)
- Web with Spider
- Engine for Win & .NET
- Engine for Linux

(800) IT-FINDS | [www.dtsearch.com](http://www.dtsearch.com)

## Processor.com

## STORAGE



Founded in 1991, Aberdeen is a leading manufacturer of servers and storage options for IT departments. Aberdeen products can be found in many of today's high-tech corporations, as well as government agencies, hospitals, and universities. Aberdeen prides itself on unmatched customer service, open and honest communications, long-term commitments to working relationships, and personal and professional integrity.

**Products Sold:**

- Components/parts
- Servers (barebones, custom, rackmount, and storage)
- Software
- Storage (DAS, iSCSI SAN, JBOD, NAS, SAN)

(800) 500-9526 | [www.aberdeencinc.com](http://www.aberdeencinc.com)

## SOURCES



Chenbro is a leader in enclosure solutions, selling its products primarily to system integrators and OEM and channel partners. The company's extensive research and development efforts help it to keep its competitive edge and maintain market leadership, with special focus on thermal, EMI, and acoustic solutions. Taiwan-based Chenbro has offices in the United States, UK, The Netherlands, and China.

**Products Sold:**

- A comprehensive line of PC chassis, server/workstation chassis, rackmount chassis, and HDD enclosures.

(909) 947-3200 | [www.chenbro.com](http://www.chenbro.com)

## EQUIPMENT DEALER



In 1987, Pegasus Computer Marketing started providing mainframe products to the end-user market. What began as a sales-only organization soon adapted to offer in-house repair and refurbishment. During the past 10 years, Pegasus has focused primarily on the point-of-sale and barcode industries, buying, selling, and providing service contracts for anywhere from a few scanners to hundreds.

**Products Sold:**

We buy, sell, and service:

- Point-Of-Sale Equipment and POS/PC Flat Panels
- Wired and Wireless Barcode Hardware
- Kronos Time Clocks and Accessories

(800) 856-2111 | [www.pegasuscomputer.net](http://www.pegasuscomputer.net)

## EQUIPMENT DEALER



NeweggBusiness is the business-to-business division of Newegg Inc., specializing in providing IT and office products. NeweggBusiness was formed in 2009 as an initiative to satisfy the growing needs of businesses, government, healthcare organizations, and educational institutions. Businesses and organizations can take advantage of features such as Net 30 Day terms, volume discounts, low-cost bulk shipping, and live inventory status.

**Products Sold:**

More than 60,000 office and computer products, including servers, desktops, notebooks, tablets, printers, scanners, monitors, network switches and routers, memory, motherboards, and software.

(888) 978-8988 | [www.neweggbusiness.com](http://www.neweggbusiness.com)

## SERVICES



Data Specialties Inc. (DSI) is a nationwide data center design-build firm with over 20 years experience. Office locations include Los Angeles, Orange County, Phoenix, Sacramento, San Diego and St. Louis, with licensing in over 20 additional states. Call 1-800-454-5164 or visit [www.WeBuildDataCenters.com](http://www.WeBuildDataCenters.com) for more information.

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are available with either a Linux or a Windows operating system"

## AberNAS N11 1U 4-Bay



Data capacity (w/ 4TB drives)	16 TB	Available x16 PCI-E 3.0 slots	1
Internal optical drive capable	✓	Available x8 PCI-E 3.0 slots	1
CPU	UP	Onboard LAN	2x 1GbE
Max memory (quad channel)	256 GB	OS drives	1
Memory slots	8	Redundant power supply	500W

## AberNAS N26 2U 12-Bay



Data capacity (w/ 4TB drives)	48 TB	Available x8 PCI-E 3.0 slots	3
Internal optical drive capable	✗	Available x4 PCI-E slots	3
CPU	UP	Onboard LAN	2x 1GbE
Max memory (quad channel)	256 GB	OS drives	2 (hot-swappable)
Memory slots	8	Redundant power supply	920W

## AberNAS N31 3U 16-Bay



Data capacity (w/ 4TB drives)	64 TB	Available x8 PCI-E 3.0 slots	6
Internal optical drive capable	✓	Onboard LAN	2x 10GbE
CPU	DP	OS drives	2 (hot-swappable)
Max memory (quad channel)	512 GB	Redundant power supply	920W
Memory slots	16		

## AberNAS N46 4U 36-Bay



Data capacity (w/ 4TB drives)	144 TB	Available x8 PCI-E 3.0 slots	6
Internal optical drive capable	✗	Onboard LAN	2x 10GbE
CPU	DP	OS drives	2
Max memory (quad channel)	512 GB	Redundant power supply	1400W
Memory slots	16		

## AberNAS N51 5U 24-Bay



Data capacity (w/ 4TB drives)	96 TB	Available x8 PCI-E 3.0 slots	5
Internal optical drive capable	✓	Onboard LAN	2x 10GbE
CPU	DP	OS drives	2 (hot-swappable)
Max memory (quad channel)	512 GB	Redundant power supply	1500W
Memory slots	16		

## AberNAS N81 8U 48-Bay



Data capacity (w/ 4TB drives)	192 TB	Available x8 PCI-E 3.0 slots	4
Internal optical drive capable	✓	Onboard LAN	2x 10GbE
CPU	DP	OS drives	2 (hot-swappable)
Max memory (quad channel)	512 GB	Redundant power supply	1800W
Memory slots	16		

## AberNAS N86 8U 64-Bay



Data capacity (w/ 4TB drives)	256 TB	Available x8 PCI-E 3.0 slots	3
Internal optical drive capable	✓	Onboard LAN	2x 10GbE
CPU	DP	OS drives	2 (hot-swappable)
Max memory (quad channel)	512 GB	Redundant power supply	1800W
Memory slots	16		



(800) 500-9526

[www.aberdeeninc.com](http://www.aberdeeninc.com)

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